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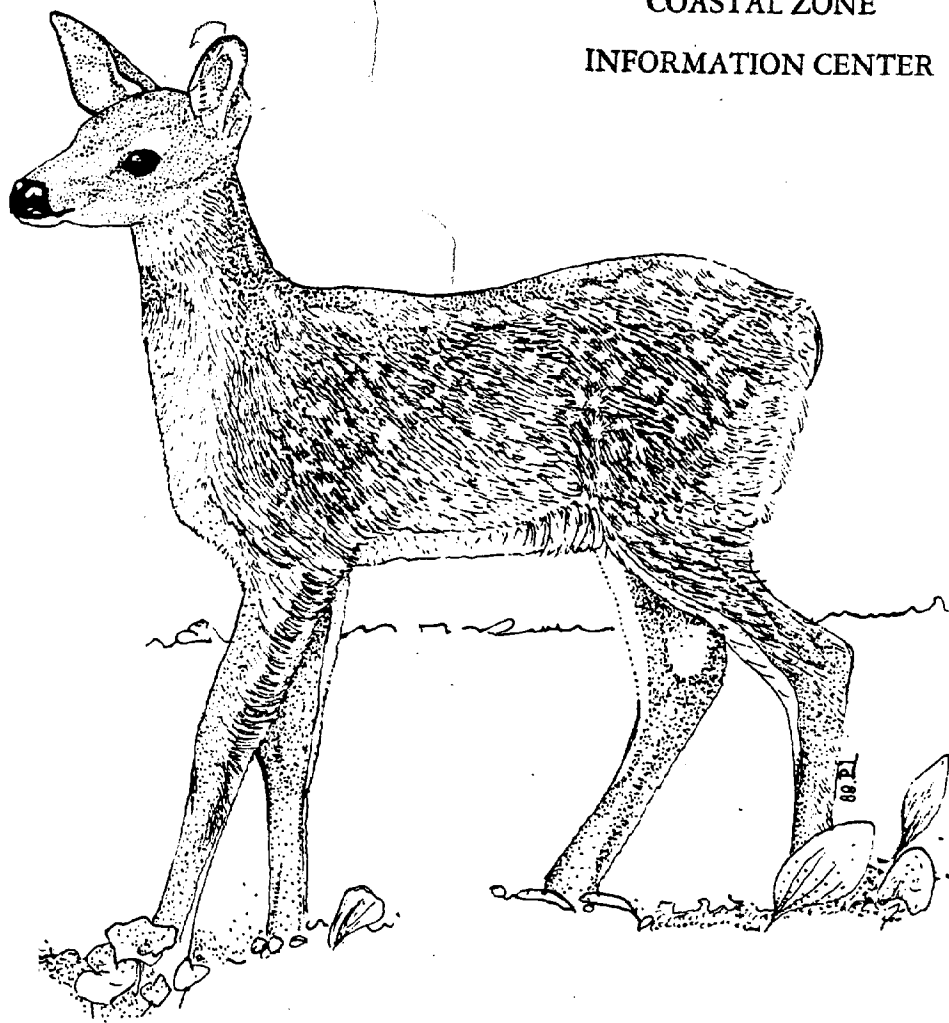
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The Identification and Management of Significant Fish and Wildlife Resources in Southern Coastal Maine

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Maine Dept of Inland Fisheries & Wildlife

THE IDENTIFICATION AND MANAGEMENT OF SIGNIFICANT
FISH AND WILDLIFE RESOURCES IN SOUTHERN COASTAL MAINE

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Augusta, Maine

23 June 1988

This document contains significant fish and wildlife resources for the following towns in southern coastal Maine.

Bath	Old Orchard Beach
Biddeford	Phippsburg
Brunswick	Portland
Cape Elizabeth	Saco
Cumberland	Scarborough
Falmouth	South Portland
Freeport	West Bath
Harpswell	Yarmouth
Kittery	

The information found in this report represents the latest knowledge and professional judgement regarding the location and protection of a variety of fish and wildlife habitats within these municipalities. This represents an initial step toward the formulation of sound policies designed to provide for the protection of sensitive habitats.



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EXECUTIVE SUMMARY

This report identifies and rates the value of wildlife and fisheries habitats for 17 towns in south coastal Maine from Kittery north to Phippsburg. Inland and coastal wetlands, deer wintering areas, seabird nesting islands, wading bird rookeries, eagle nest sites, osprey nest sites, least tern and piping plover nest sites, shorebird areas, coastal wildlife concentration areas, seal haul-outs, and other special wildlife habitats were identified and mapped. The sensitivity of each special habitat is discussed and recommendations are presented to prevent or minimize the impacts of human activities on these areas. Maps are available from local towns, the State Planning Office, and the Maine Department of Inland Fisheries and Wildlife regional office.

A method for objectively determining the value of open space for wildlife is also included. The procedure is based on the diversity and abundance of species within 16 habitat types and incorporates the special habitats listed above, total acreage, and scarcity of the habitat type. An example field evaluation form is included.

PROJECT DESCRIPTION

In a previous study, special habitats important to fish and wildlife, such as deer wintering areas, wetlands and shorebird areas, were identified and rated for nine towns in southern Maine (Jones 1986). This type of information is needed as coastal towns face critical decisions regarding resource development and protection. Most local governments do not have the information needed to delineate important areas for maintaining fish and wildlife populations within their town. Often the required information is located within several different state agencies and private conservation organizations making it difficult for towns to incorporate current data into their comprehensive plans. Therefore, this study was undertaken to identify, rate and map fish and wildlife habitats of special interest in seventeen towns: Kittery, Biddeford, Saco, Old Orchard Beach, Scarborough, Cape Elizabeth, South Portland, Portland, Falmouth, Cumberland, Yarmouth, Freeport, Brunswick, Harpswell, West Bath, Bath, and Phippsburg. Recommendations are included for each type of special habitat.

The information in this report is separated into two sections. The first section, "SPECIAL HABITATS" identifies, rates and maps special habitats of fish and wildlife such as deer wintering areas, wetlands, and heron rookeries (Appendix 2). It also reports on the sensitivity of these special habitats to alterations or disturbance, and presents recommendations regarding the protection of these areas. Detailed analysis of data and site visits were commonly conducted to obtain the information in this section. Maps are not included in this document but rather are available in towns, the State Planning Office, and the Maine Department of Inland Fisheries and Wildlife (MDIFW) regional office.

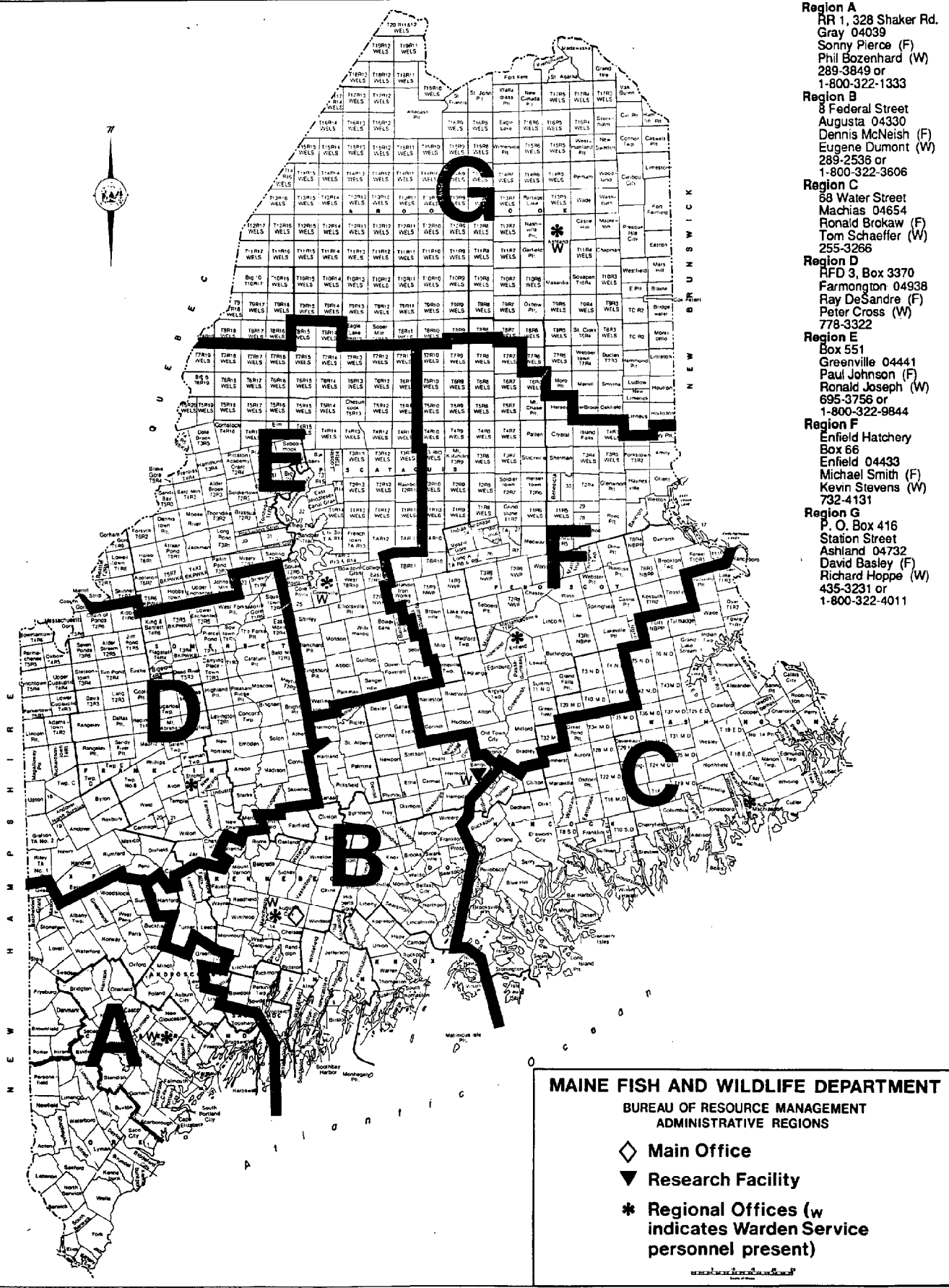
The second section, "OPEN SPACE FOR WILDLIFE", uses a wildlife habitat relationship (WHR) model (Thomas et.al. 1979, Marcot 1979, Verner and Boss 1980) to provide a standardized method for evaluating the relative importance of different types of open space for wildlife. The model is based on the relative diversity and abundance of wildlife within certain habitats, and the relative abundance of habitats within the study area. Preserving undeveloped, open space is essential for maintaining the survival of the full range of wildlife species -- deer, game birds such as grouse and woodcock, furbearers, small mammals, and nongame species such as hawks, warblers, amphibians, and reptiles -- currently inhabiting southern Maine. These open spaces also provide areas where wildlife can be used and enjoyed by the public. (Scientific names for all species are included in Appendix 1).

Detailed information on methods and results for both sections is contained in the appendices.

It is intended that the information contained in this report be used during planning and decision making by state and local officials to prevent or minimize the impacts of development on fish and wildlife resources. In addition, it may be useful to private land trusts interested in acquiring valuable habitat for wildlife. This comprehensive approach may be used in conjunction with the report, The Cumulative Impacts of Development in Southern Maine: Important Wildlife Habitats (Jones 1986).

For additional information, contact the appropriate regional fish or wildlife biologist for your area listed on Figure 1.

Figure 1



Part I: SPECIAL HABITATS








This section discusses the special types of wildlife and fisheries habitats that were identified and mapped for the 17 towns in this study. Each habitat was identified and rated, if appropriate, using the most current information available. Habitats were mapped on mylar overlays using mylar base maps at a scale of 1:10000. The maps are available in the 17 town offices, MDIFW offices, and the State Planning Office. The Special Habitats identified and mapped are:

- Aquatic habitats
- Deer wintering areas
- Coastal wildlife concentration areas
- Colonial nesting seabird islands
- Wading bird rookeries
- Eagle nest sites
- Osprey nest sites
- Shorebird feeding and roosting areas
- Seal haul-outs
- Least tern and piping plover nesting sites
- Other special wildlife habitats

The objectives of this section were to: 1) document known fish and wildlife habitats of special importance to local inland fish and wildlife; 2) discuss the sensitivity of these areas, and 3) present recommendations designed to prevent or minimize the impacts of future growth and development on these natural resources.

Table 1. Summary of the descriptions of special habitats and associated recommendations. (More than one type of special habitat may occur in a site of concern, and may require the application of multiple recommendations).

Special Habitats	Symbol/Rating	Description	Recommendations
Aquatic Habitats	F = Fisheries/W = Wetlands		
	F3	High value ponds, lakes, rivers, and streams for fisheries.	Protect riparian habitat within 250' or more of all F2, F3, W2, and W3 areas. Within the first 100 feet of the riparian buffer, no development or vegetative manipulation should occur other than accepted fish and wildlife management practices or other activities which will not permanently change the site or adversely impact fish and wildlife. Within the remaining 150 feet, timber harvesting should not remove more than 20% of the volume of trees 6 inches or more in diameter, measured at 4 1/2 feet above ground level in any 10-year period. Single openings in the forest canopy should not exceed 14,000 square feet. In such areas, single canopy openings of over 10,000 square feet should be no closer than 100 feet apart. Development should not occur within the outside 150 feet without prior consultation with MDIFW.
	F2	Moderate value ponds, lakes, rivers, and streams for fisheries.	
	W3	All coastal salt marshes, and all wetlands with high value for wildlife.	
	W2	Moderate value wetlands for wildlife.	
Marine Wildlife Habitats	F1	Low value ponds, lakes, rivers and streams for fisheries.	Protect riparian habitat within 100' or more of all F1 and W1 areas. Within this riparian buffer, no development or vegetation manipulation, other than MDIFW approved fish and wildlife management, should occur.
	W1	Wetlands with only slight wildlife value.	
	W5, F5	Indeterminate status.	Consult with MDIFW to determine importance of the habitat and appropriate land uses.
	MW/H/A	Areas of national or statewide significance for coastal wildlife, supporting an exceptionally high abundance and diversity of wildlife.	Protect riparian buffer within 250' or more of the mainland and all islands bordering Class A Areas with no development or habitat modification allowed. Modification of the intertidal or submerged lands from activities such as dredging, filling, or placement of permanent or semi-permanent structures or moorings should be restricted. Land uses such as marinas and recreational or industrial developments that would increase water-oriented activities should be avoided. A detailed land-use wildlife conservation plan should be completed.
	MW/H/B	Areas of significance within a region of the Maine coast that supports a high abundance and diversity of wildlife.	Protect riparian buffer within 100' or more of the mainland and all islands bordering Class B Areas with no development or habitat modification allowed within it. No more than 15% of the intertidal and submerged lands areas should be altered or modified by activities such as dredging or placement of structures. Land-uses such as marinas and recreational developments could be allowed. Industrial development should be avoided.
	MW/H/C	Areas of local significance that support moderate abundance and diversity of wildlife.	Protect riparian buffer within 100' or more of the mainland and all islands bordering Class C Areas with no development or habitat modification allowed within it. No more than 25% of the intertidal and submerged lands area should be altered or modified by activities such as dredging or placement of structures. Land uses such as marinas and recreational developments are allowed. Light industrial development could also be allowed.

Deer Wintering Areas	D3 D2 D1	High value Deer Wintering Area. Medium value Deer Wintering Area. Low value Deer Wintering Area.	<p>Protect deer wintering areas of moderate and high value (D2 & D3) from development. Development within D1 & D5 wintering areas should be closely regulated to prevent fragmentation or loss of significant habitat. Consult with MDIFW to determine the impact of non-conforming land uses.</p> <p>Timber harvesting in any deer wintering area can remove as much as 20% of the total volume in any 15-year period. Single openings in the forest canopy should not exceed 14,000 square feet. In such areas, single canopy openings of over 10,000 square feet should not be closer than 150 feet apart. Timber harvesting which exceeds these guidelines should be approved by the town in consultation with MDIFW's regional wildlife biologist.</p>
	D5	Indeterminate status.	Consult with MDIFW.
Colonial-Nesting Seabird Islands		Coastal islands used by seabirds for nesting.	Protect existing habitat. Control development and discourage human disturbance during the nesting season (April 1 - August 15).
Wading Bird Rookeries		Location where great blue herons or other wading birds nest.	Protect existing habitat within the colony, control land use activities out to 1320' from the colony perimeter based on recommended levels of protection for 3 concentric buffer zones, and discourage human activity during the nesting season (April 1 - August 15).
Bald Eagle Nest Sites		An active or recently active nest site (since 1962).	Protect the area surrounding nest sites from development. Control land use 1320' from the nest tree based on recommended levels of protection for 3 concentric buffer zones, maintain the integrity of existing shoreland habitat, and protect a supply of nearby alternative nest trees. Discourage human disturbance during the nesting season (February 1 - August 31 in coastal Maine and March 1 - September 30 inland).
Osprey Nest Sites		An active or recently active nest site (since 1980).	Control land use activities within 660' of active nests from April 1 - August 15 in coastal Maine, April 15 - August 15 inland), maintain the integrity of existing shoreland habitat, and minimize human disturbance during the nesting period. Colonial-nesting pairs should be buffered collectively.
Shorebird Feeding and Roosting Areas		Traditional areas of use by large numbers of feeding and roosting shorebirds.	Protect a 250' or more buffer of existing shoreland habitat, discourage activities that would diminish intertidal invertebrate populations, and minimize human disturbance during peak migration (July 10 - September 10).
Seal Haul-Outs		Coastal ledges used by seals.	Discourage disturbance of hauled-out seals, and minimize the risk of oil spill contamination by directing sitings of major marinas and oil tanker shipping lanes away from haul-out ledges.
Least Tern and Piping Plover Nest Sites		Sand beaches used by least terns and piping plovers for nesting.	Specific recommendations have not been developed at this time but will be directed toward protecting habitat and preventing human disturbance during the nesting season. An MDIFW regional biologist should be consulted.
Other Special Wildlife Habitats		Areas of special management concern for wildlife, not included in the preceding descriptions.	Recommendations will vary with the type of habitat. An MDIFW regional biologist should be contacted for specific recommendations.

A. AQUATIC HABITATS

1. **Sensitivity.** Aquatic habitats, which include brooks, creeks, rivers, and streams, great ponds and lakes, inland and coastal wetlands; marine wildlife habitats; and the extremely important riparian zones that adjoin them, are habitat types of exceptional value to a wide array of fish and wildlife species. They are also some of the most sensitive and vulnerable habitat types.

The importance and sensitivity of all wetlands, regardless of size, is well documented. Wetlands and tidal flats provide critical habitat for nesting and migrating shorebirds, wading birds, waterfowl, gulls, terns and raptors. Salt marshes and tidal flats also provide essential habitat for commercially sought fish species, worth millions of dollars annually to Maine fisherman (Townsend and Briggs 1982).

The "riparian zone" is the upland area immediately adjacent to a lake, stream or wetland. It functions to protect the water quality and the wildlife values of the adjacent aquatic habitat. It also provides a special habitat utilized by many animals as part of their home range or as a travel corridor for movement between undeveloped forested areas. Specifically, riparian zones:

- provide essential habitat for a diversity of vertebrate species;
- serve as natural filtration systems trapping and assimilating excessive nutrients, sediments and other pollutants from upland areas, thereby maintaining aquatic habitat water quality;
- maintain suitable water temperatures for aquatic life; and
- provide vegetation and invertebrates as food for a variety of fish and aquatic wildlife (summarized from Brinson et al. 1981, Thomas et al. 1979, Curtis and Ripley 1975).

A more complete discussion of the importance of riparian zones for fish, birds, and mammals is contained in Appendix 3.

2. **Methods.** This report separates aquatic habitats into three types: fisheries, inland and coastal wetlands and marine wildlife habitats.

- a. **Fisheries Habitats (F):** Fisheries habitats associated with streams and lakes were identified, evaluated, and mapped in this project (refer to Appendix 4 for detailed information).

Streams (including brooks, creeks, and rivers) were identified using the stream inventory file developed by MDIFW. Data collection included a determination of fish species present, basic water quality and habitat descriptions. In addition, data on drainage areas, lengths, widths and areas of streams, general surficial geology, and the presence or absence of known aquifer areas were collected from field surveys, maps and other available sources.

Lakes (including ponds) were identified using the computerized lake inventory file (Maine Information Display Analysis System, MIDAS) developed by MDIFW. Only "great ponds" (defined as any natural water body 10 acres or larger or any impoundment greater than 30 acres if bordered by more than one property owner) were included in this study. Data on physical shape, water quality, and fisheries were collected from each lake.

A systematic method was developed to rate lake and stream habitats based on their fisheries value. These habitats were placed in one of three rated categories (F1, F2, or F3) or an indeterminate category (F5) based on their characteristics (Table 2).

- b. **Wetland Habitats (W):** Both inland and coastal wetlands were identified, evaluated, and mapped using data from MDIFW's wetland inventory and from the Maine Geological Survey's (MGS) wetland inventory. MDIFW's wetland inventory is designed to be a continuous study to identify and rate wetlands for their value to waterfowl. The inventory was initiated in 1965 and is based on aerial photographs and/or ground surveys conducted by department personnel. The inventory includes all wetlands 10 acres or more in size as well as some smaller ones. Numerous wetlands less than 10 acres are rich in wildlife, contribute to groundwater recharge, and act as natural filtration mechanisms. Although these wetland areas were not included in this report, they are still valuable and perform many of the same functions.

Table 2. Rating and description of fisheries habitats (streams and lakes).

Category	Value	Habitat Type	Description
F3	High	Streams	a) Highly suitable habitat to support game fish, b) Contains fish species which are highly sensitive to changes in physical features, water quality, or temperature, c) contains fish species which are rare within study area, d) has a quality fishery in high demand, e) habitat area of greater than 10 acres occurring within main stem of the stream, and f) high economic importance.
		Lakes	a) High water quality, b) heavy fishing pressure, c) high species abundance, d) high species diversity, e) contains fish species which is rare within the study area, and f) fish species have high incidence of natural reproduction.
F2	Medium	Streams	a) Moderately suitable habitat to support game fish, b) contains fish species which are moderately sensitive to changes in physical features, water quality, or temperature, c) contains fish species which are moderately common within study area, d) has a quality fishery in moderate demand, e) habitat area of from 5 to 10 acres occurring within main stem of the stream, and f) moderate economic importance.
		Lakes	a) Moderate water quality, b) moderate fishing pressure, c) moderate species abundance, d) moderate species diversity and rarity, and e) moderate incidence of natural reproduction.
F1	Low	Streams	a) Low suitable habitat to support game fish, b) contains fish species which are tolerant to changes in physical features, water quality, or temperature, c) contains fish species which are common within study area, d) fishery in low demand, e) habitat area of less than 5 acres occurring within main stem of the stream, and f) low economic importance.
		Lakes	a) Low water quality, b) fishery in low demand, c) low species abundance, d) poor species diversity, e) species very common, and f) minimal or no incidence of natural reproduction.
F5	Indeterminate	Streams & Lakes	a) mapped or not mapped b) not evaluated or rated as F1, F2, or F3

Wetlands were rated based on their waterfowl habitat value. Wetlands were placed in one of three categories (W1, W2, or W3) if from MDIFW inventory, or an indeterminate category (W5) if from MGS inventory (Table 3). A list of the wetland types and their descriptions used in MDIFW's wetland inventory is found in Appendix 5.

- c. **Marine Wildlife Habitats (MWH):** Marine Wildlife Habitats are locations along the Maine coast which support large numbers of marine birds and seals. These concentration areas are generally associated with islands, ledges and inter-tidal "flats". A combination of aerial surveys and ground surveys and censuses were used to identify these areas. These surveys were conducted during the winter, spring migration, nesting, post-nesting and fall migration periods. The seasonally mapped observations of marine birds and seals were then analyzed to identify and rank Marine Wildlife Habitats.

MWH's were delineated by drawing a line around clumped observations seaward to the thirty-foot depth contour when possible, or a distance of approximately 300 feet from the central geologic feature with which the animals were associated. For those areas adjacent to the mainland or islands, the shoreward limit of the wildlife area is 250 feet above mean high water. Each area was rated based on the diversity, abundance and rarity of the wildlife it supported. A full description of the survey and rating methods can be found in the Penobscot Bay Conservation Plan (Woodward et al. 1987). The data for identifying and rating marine wildlife habitats are from two recent projects conducted by MDIFW (Hutchinson and Ferrero 1980, Hutchinson and Lovett 1983). Data for 5 towns (Kittery, Biddeford, Saco, Old Orchard Beach, and Scarborough) were not collected in these previous projects; therefore, marine wildlife habitats in these towns were not identified. Information in these towns is currently being collected and will be available from the Regional Wildlife Biologist.

Marine wildlife habitats were classified into one of three categories based on their significance to coastal wildlife (Table 4).

3. Recommendations::

a. Fisheries (F) & Wetland (W) Habitats:

Distances used in the recommendations are

Table 3. Rating of wetlands based on waterfowl habitat value.

<u>Rating</u>	<u>Value</u>	<u>Description</u>
W3	High	<ul style="list-style-type: none"> a) Excellent waterfowl habitat, b) heavy use by ducks and/or geese, and c) all coastal salt marshes.
W2	Moderate	<ul style="list-style-type: none"> a) Lacking in one or more aspects of prime habitat, b) significant use by ducks and/or geese, and c) would respond favorably to management.
W1	Low	<ul style="list-style-type: none"> a) Deficient in habitat requirements, b) limited use by ducks and/or geese, and c) generally would not respond favorably to habitat management.
W5	Indeterminate	<ul style="list-style-type: none"> a) Very poorly drained soils, and b) not evaluated.

Table 4. Classification of marine wildlife habitats.

<u>Class</u>	<u>Value</u>	<u>Description</u>
MWH A (Class A)	Exceptional	<ul style="list-style-type: none"> a) Areas of national and/or state significance for coastal wildlife, b) Very high species abundance and diversity, and/or c) Includes rare and endangered species.
<hr/>		
MWH B (Class B)	High	<ul style="list-style-type: none"> a) Areas utilized by more common species with regularity, and b) High species abundance and diversity.
<hr/>		
MWH C (Class C)	Moderate	<ul style="list-style-type: none"> c) Areas of documented but moderate wildlife use.

measured in the following manner:

F1, F2, F3 and F5 areas - distance is measured horizontally from the seasonal high water mark (Figure 2).

W1, W2, W3, and W5 - for coastal wetlands, the distance is measured horizontally from an identifiable debris line left by tidal action, edge of tidal action or normal storm flowage, or from the edge of vegetation present that is tolerant of salt water and

- for inland wetlands, the distance is measured from the normal high water mark which is identifiable by apparent visible markings, changes in soil character due to the prolonged action of water, or from changes in vegetation from predominantly aquatic to predominantly terrestrial.

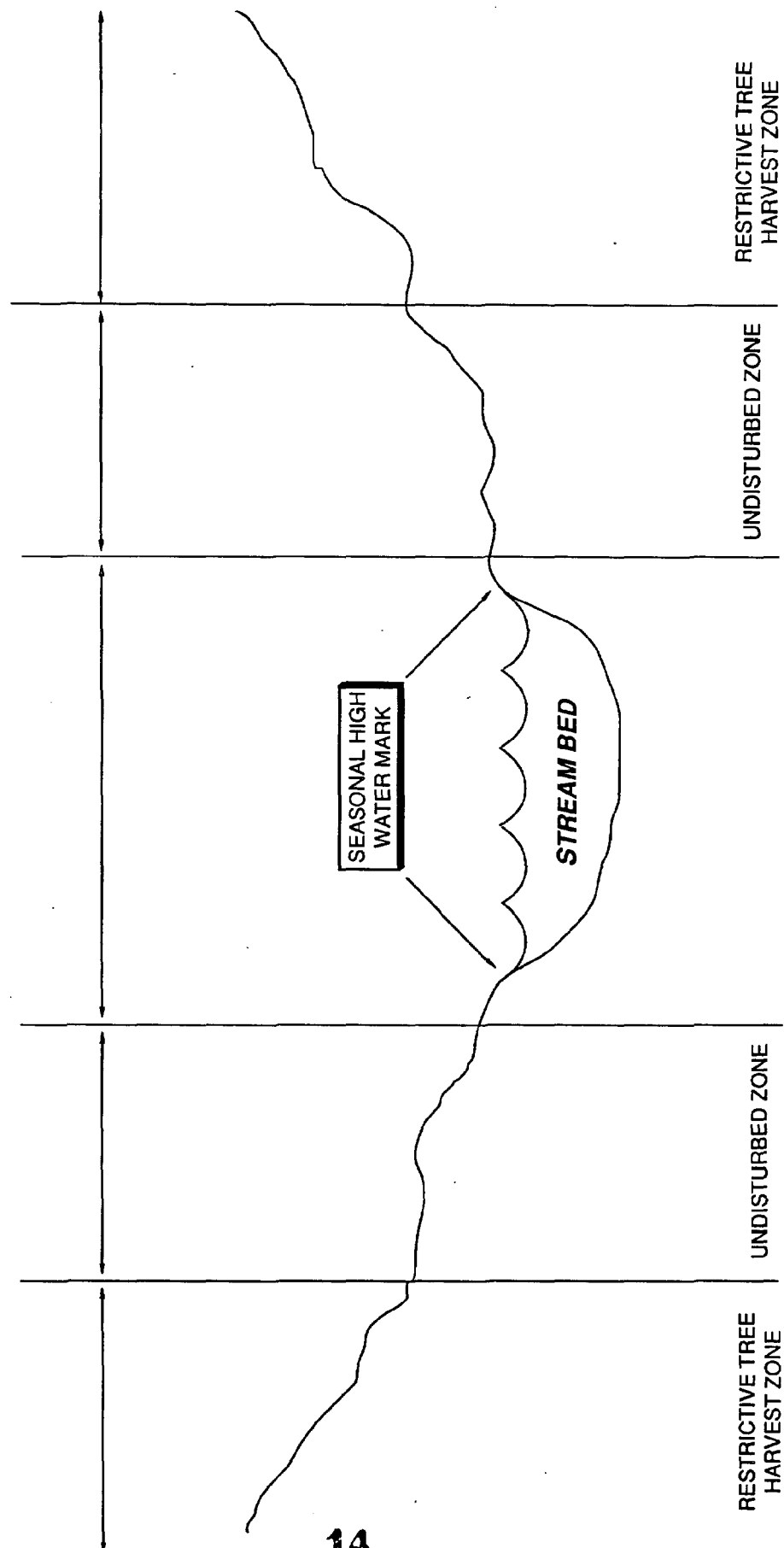
W3, W2, F3, and F2--Existing riparian habitat should be maintained within 250' or more of all W3, W2, F3 and F2 areas. For F2 and F3 areas, the 250' riparian area includes protection for wildlife habitat as well as water quality and fisheries habitat.

The first 100 feet of riparian habitat should be protected from human disturbance.

Within the remaining 150 feet, timber harvesting should not remove, in any ten year period, more than 20 percent of the volume on each acre involved of trees six inches in diameter and larger measured at 4 1/2 feet above ground level. Single openings in the forest canopy should not exceed 14,000 square feet. In such areas single canopy openings of over 10,000 square feet shall be no closer than 100 feet apart. Development should not occur within this area without consultation with the MDIFW Regional Wildlife Biologist.

Direct filling of wetlands, which eliminates or alters their unique characteristics, should generally be considered unacceptable. Appropriate state and federal laws and permitting requirements must be fulfilled.

FIGURE 2
STANDARD METHOD FOR MEASURING RIPARIAN ZONE



W1, F1--Existing riparian habitat should be maintained within 100' or more of all F1 and W1 areas. New development or vegetation manipulation, other than MDIFW-approved fish and wildlife management practices, should not occur within this zone.

Direct filling of wetlands, which eliminates or alters their unique characteristics, should generally be considered unacceptable. Appropriate state and federal laws and permitting requirements must be fulfilled.

W5, F5--Prior to any activity within 250 feet of a W5 or F5 area, MDIFW should be consulted to determine the significance of the fisheries or wetland habitat and the appropriate management recommendations.

b. Marine Wildlife Habitats (MWH):

The land use recommendations for MWH's are designed to protect the wildlife values within each of the three habitat categories. In many instances, MWH's include "Special Wildlife Features" within their boundaries such as eagle nest sites, colonial nesting seabird islands, shorebird roosting and feeding areas, or seal haul-outs. When such Special Features occur, the specific recommendations for each feature (presented in later sections of this report) should be followed as well.

MWH A (Class A Area)--An area of national and/or state significance for coastal wildlife.

Class A Areas, including the intertidal lands, submerged lands, and surrounding riparian zone should be protected and maintained. Existing habitat should not be degraded through alteration or development.

Existing habitat should be maintained within a 250' or more riparian buffer on the mainland and all islands included within Class A areas. New development or other modification to the existing habitat should not occur within this area, except for MDIFW approved wildlife management practices. Also, no additional modification of the intertidal or submerged lands should be allowed by activities such as dredging, filling, or placement of permanent or semi-permanent structures or moorings.

Increased water oriented activities within or adjacent to these areas, such as marinas and recreational or industrial developments are not compatible land uses.

A detailed land use plan should be prepared for each Class A Area. This plan should be prepared by municipal land use planners in consultation with the MDIFW.

Key parcels in Class A areas, such as eagle nest sites, colonial nesting seabird islands, other Special Wildlife Features, or strategically located, undeveloped habitats in the riparian zone should be targeted for special protection through acquisition, conservation easements, or landowner management agreements.

MWH B (Class B Area): An area within a region of the Maine coast of significance for coastal wildlife.

Existing habitat should be maintained within a 100' or more riparian buffer on the mainland and all islands included within Class B areas. New development or other modifications to the existing habitat should not occur within this area except for MDIFW approved wildlife management practices. Also, no more than 15% of the intertidal and submerged lands area should be altered or modified from activities such as dredging or placement of structures.

Land-uses that would increase water oriented activities such as marinas and recreational developments could be allowed. However, industrial development should not occur within these areas.

If any Special Wildlife Features occur, their specific management guidelines should be applied.

MWH C (Class C Areas): An area of local significance for coastal wildlife.

Existing habitat should be maintained within a 100' or more riparian buffer on the mainland and all islands included within the Class C areas. New development or other modifications to the existing habitat should not occur within this area except MDIFW wildlife management practices. Also, no more than 25% of the intertidal and submerged land area should be altered or modified from activities such as dredging or placement of structures.

Land-uses that would increase water oriented activities such as marinas and recreational developments are allowed. Light industrial development could also occur without affecting the value of the area.

If any Special Wildlife Features occur, their specific management guidelines should be applied.

B. DEER WINTERING AREAS

1. **Sensitivity.** Winter has long been considered a bottleneck for the survival of white-tailed deer in the Northeast (Severinghaus 1947). During winter, deer in northern climates subsist on often limited quantities of low quality foods, while simultaneously coping with the stresses of low temperatures, chilling winds, and higher energy requirements (Lavigne 1986). When confronted with thermal stress, deer must increase their metabolic heat production and conserve energy to survive. In Maine, studies indicate that mortality of deer can exceed 35% of the wintering deer herd during a severe winter (Hugie 1973). Frequent severe winters or marginal winter habitat may reduce the deer population to a small fraction of the carrying capacity of its summer range (Potvin and Huot 1983).

The primary behavioral mechanism for deer to conserve energy during winter is to move to traditional wintering areas or "deer yards". During winter, deer concentrate into ranges that are only 20-30% the size of their summer range (Bozenhard pers. comm.). These Deer Wintering Areas (DWA's) provide deer with shelter from radiant heat loss as well as improved mobility in snow (Mattfeld 1974). The dense canopy of softwood cover in a DWA moderates the effects of winter by maintaining warmer than average temperatures and by greatly reducing wind velocity (Lavigne 1986). The dense cover also intercepts much of the snow fall and ground accumulations are packed firmly (Ozoga 1968). This makes travelling much easier for deer and decreases their energy demands.

Deer subjected to milder winters (ie. southern Maine) require shelter of lower quality than deer inhabiting more severe winter environments (Gill 1957, Banasiak 1964). However deer surviving on diets of woody browse readily seek and use winter shelter even in the absence of restrictive snow depths (Ozoga and Gysel 1972).

New development and other modifications to the habitat within traditional deer wintering areas reduce the overall ability of an area to support deer during periods of severe winter weather. The more development which occurs within these areas, the greater the impact on local deer populations. The availability of high quality winter range allows a higher winter population of deer, and enables them to more fully occupy their summer habitat.

2. **Methods.** Wintering areas for deer were identified using aerial and ground surveys. A Cessna 172 was flown at an altitude of 500 feet or lower and at a speed of approximately 100 miles per hour. Seven flights were conducted between 16 January and 27 February, 1987, and ranged from 2 to 4 hours long. Flight transects were followed from lines drawn on 7.5 minute topographical maps, and each transect was 0.5 mi apart. Two observers searched for evidence of tracks from opposite windows of the plane. When tracks or deer were seen, the area was marked on the map.

Once areas were identified from the air, color infrared photos were used (when available) to position transects for the ground survey. These transects were walked and the following features were noted: 1) dominant overstory type (softwood, hardwood, or mixed), 2) approximate height, 3) crown closure, 4) available browse species, 5) evidence of deer tracks, trails, pellets, beds, or browse.

The information collected during the winter ground surveys was used to evaluate each DWA according to the following seven major criteria:

Access - Considered the distance from the DWA to the nearest all weather roads. Areas with easy access were considered to be of greater value.

Shelter Quality - Considered tree species composition, stand size and aspect. Areas with mature softwoods, a high canopy closure and a southern exposure were considered to be optimum shelter.

Browse Availability - Considered browse that is currently available and the potential for existing stands to produce browse under more intensive management. Areas with available browse or the potential to produce browse with management, were considered to be of greater value.

Relationship to Other DWAs - Considered relative proximity to other DWAs. Areas at least three to five miles apart were considered to be of more value.

Size - Considered shape and acreage. Large areas with a high degree of linearity were evaluated to be of greater value.

Deer Population--Considered the amount and frequency of deer use (tracks, trails, beds, pellet groups) observed during the field survey. Areas with heavy, continuous deer sign were considered to be over-wintering ≥ 50 deer/mi². These areas were considered to be of greater value.

Operability of the Forest Stands (Exclude Access)--The general intent of DWA management is to maintain a proper balance of winter cover and food for the deer utilizing the area. This balance is created and maintained through periodic timber harvesting in the wintering area. Deer Wintering Areas in which timber management and harvesting can be easily implemented and executed have high operability. Deer Wintering Areas with high operability were considered to be of greater value.

Each DWA was rated by evaluating each of the components which make up the seven criteria above (Appendix 6) and assigning a value of 1 through 5 to each criteria. A value of one represented the least desirable condition, while 5 represented the most desirable.

Following the evaluating procedure, each DWA was rated and placed in one of three value categories or an indeterminate category for areas which have not yet been rated (Table 5).

Based on the aerial surveys and ground checks, boundaries for each DWA were developed, which included the winter cover area and adjacent foraging areas, using color infrared (1:15,000) or black and white (1:60,000) aerial photos.

3. **Recommendations.** New development is generally not compatible with the maintenance of suitable conditions within deer wintering areas and should be very closely regulated, and in most cases not permitted in areas of moderate (D2) or high (D3) value. Prior to any development within areas of low (D1) or indeterminate (D5) value, it is recommended that IF&W be consulted in the formulation of specific land use restrictions to prevent fragmentation or loss of significant habitat.

Timber harvesting is an essential component of

Table 5. Rating and Description of Deer Wintering Areas
(DWAs)

<u>Rating</u>	<u>Value</u>	<u>Description</u>
D3	High	Received a value between 22-35 in the evaluation procedure. These DWA's constitute excellent deer winter range. They are critical to achieve goals and objectives in MDIFW's White-tail Deer Species Plan.
D2	Moderate	Received a value between 18-21 in the evaluation procedure. These areas are lacking in several of the components of prime habitat, although through management these deficiencies may be corrected. These areas are important to achieve goals and objectives in MDIFW's Whitetail Deer Species Plan.
D1	Low	Received a value between 7-17 in the evaluation process. These areas may periodically provide shelter for small numbers of deer, however, they do not possess the characteristics associated with better winter cover. These areas may not be essential to MDIFW's whitetail deer goals and objectives.
D5	Indeterminate	These areas have not been rated.

deer wintering area management and should be a permitted activity. The general goal in managing DWA's is to maintain approximately 50% of the area in mature conifer forest types. The individual conifers in mature softwood stands are generally older than 45 years of age, are taller than 35' high and are 7-8" or larger in diameter at breast height (4 1/2 feet above ground level). To maintain approximately 50% of the wintering area in mature conifer cover, each landowner can harvest as much as 20% of the total timber volume on his ownership in any 15 year period. In addition, single openings in the forest canopy created during timber harvesting should not exceed 14,000 square feet. In such areas, single canopy openings larger than 10,000 square feet shall be no closer than 150 feet apart.

Non-permanent, minimal disturbance (light or no bulldozing and no graveling of the travel surface) roads are recommended when a land management road must be located in a DWA to allow access for timber harvesting. The disturbed right-of-way for these roads shall not exceed 30 feet. The road should be limed, fertilized and seeded following timber harvesting activities.

Land management activities which are not in conformance with these general recommendations, or which are not specifically addressed by them, should be addressed in a management plan, developed by the landowner, a licensed forester, or a wildlife biologist, and submitted to the town for approval. Consultation with the appropriate MDIFW regional wildlife biologist prior to the formulation of any deer wintering area management plan is strongly recommended.

The town should have the MDIFW regional wildlife biologist review the deer wintering area management plans prior to granting approval.

C. COLONIAL NESTING SEABIRD ISLANDS

1. **Sensitivity.** Between three and four thousand islands and exposed ledges occur along the Maine coast. Three hundred and fifty of these are of special significance because they are used as traditional sites by twenty species of colonial-nesting seabirds.

Many of these birds are at the northern or southern limit of their range. For several species (common eider, black guillemot, Atlantic puffin, razorbill auk, great cormorant, Leach's storm petrel), Maine is the only state within the contiguous 48 states with breeding populations.

Populations of colonial nesting seabirds throughout Maine were decimated by the late 1800's by overharvesting for meat, eggs, and feathers. The growing list of vanishing species sparked national interest, and was the issue of concern which prompted formation of the National Audubon Society and led to the drafting and promulgation of the Migratory Bird Treaty Act of 1918.

Those birds which survived the excessive exploitation of the 19th century responded well to the protective legislation, which coincided with the collapse of many island-based economies. Numerous island communities were abandoned, allowing historic seabird islands to be recolonized by colonial nesting seabirds. It is of the utmost importance to understand that both the protective legislation and the off-island emigration of people were requisite to the rapid recovery of many species which we have observed during the past six decades. Had 19th century levels of human disturbance and occupation of breeding habitat been maintained, existing legislation alone would not have produced this recovery.

Colonial nesting marine birds are extremely vulnerable to the effects of development and associated human disturbance during the nesting season. Disruption of nesting birds at this critical time can result in excessive mortality of chicks and eggs from predation and exposure.

The recent explosion of development along the coast is threatening to reverse this recovery through the escalating demands on islands for recreation and homesites.

2. **Methods.** Ground surveys and censuses were conducted between 1981 and 1986 to identify and inventory colonies of nesting seabirds. Islands were identified for ground surveys by historic records, the sightings of birds, or the presence of suitable habitat. Islands found with nesting marine birds were censused using direct nest counts and/or visual estimates of adult birds.
3. **Recommendations.** The recommendations presented in this section are broad. They are an attempt to address the full range of possible situations that may arise when human activity influences colonial nesting seabird islands. Where there is doubt about the interpretation or application of these recommendations, it is strongly recommended that the appropriate MDIFW regional wildlife biologist be contacted for assistance.

From April 1 to August 15, human use of these islands should be discouraged. Activities around the islands should be conducted far enough off shore to prevent flushing birds from nests (approximately 1/4 mile).

Development or building should not occur on seabird nesting islands, except in very rare cases where the nesting colony is located in a relatively small area of a large island, and adequate visual buffers (equal to or greater than 250 feet) can be maintained to prevent disturbance. Limited construction should only occur after review and approval by an MDIFW wildlife biologist.

Recommendations for human use of any seabird nesting island can be developed by the appropriate MDIFW regional biologist and implemented through cooperative agreements with private landowners and state agencies having ownership of, or jurisdiction over, seabird islands. In general, low intensity recreational use, such as picnicking and hiking, can be permitted outside the nesting season. The building of fires should be prohibited at all times.

D. WADING BIRD ROOKERIES

These recommendations were developed for great blue herons but in general can apply to other wading birds such as snowy egrets, glossy ibis, black-crowned night herons, tri-colored herons, and little blue herons.

1. **Sensitivity.** The stately great blue heron is the largest and most well-known of Maine's wading birds. Returning to the state in March or April from their more southerly wintering grounds, adult herons reclaim nests from the previous year in colonies ranging in size from two to over two hundred nesting pairs. During the nesting season (approximately 1 April through 15 August) nests are repaired or built anew, and clutches of 3-4 eggs are laid and incubated. The young hatch in late May or early June. Young are fed on the nest until they fledge in July or August, at which time the birds abandon the nesting colony and disperse to coastal and inland feeding areas. Fall migration extends into November, with an occasional bird or two remaining in coastal areas during mild winters.

Great blue herons feed on a variety of fresh and salt water organisms. Small fish and marine invertebrates are captured in tidal pools and creeks. Frogs, small fish, and the larger freshwater invertebrates are taken in shallow fresh-water habitats. The great blue heron is extremely vulnerable to the cumulative effects of pollutants entering the water from residential, industrial and agricultural sources because many of the aquatic organisms on which it feeds accumulate chemicals from the water column and bottom sediments and concentrate them within their tissues. In many states, pollution of feeding areas has reduced populations to the point of extinction.

Coastal nesting colonies are typically located on islands or peninsulas which are remote from human disturbance, and are often several miles from feeding areas. Nests are built of sticks near the tops of either softwood or hardwood trees, and are typically re-used from year to year until the nest tree dies and blows down, or the colony abandons the site.

The two most important factors governing the continued presence of both inland and coastal nesting great blue herons in Maine are the availability and abundance of undisturbed nesting habitat and undisturbed, uncontaminated feeding

areas. Human disturbance of a nesting colony can cause: 1) abandonment of the entire colony; 2) mortality of eggs and young from predation (gulls, ravens, eagles) and exposure; and 3) starvation and predation of young that leave the nest before they are able to fly (adults will not feed young on the ground).

2. **Methods.** Heron rookeries were located from information obtained from a variety of sources. Historical records and observations during aerial and ground surveys provided the majority of the locations. Historical nesting sites which continued to have suitable habitat were mapped even if not active every year. The nesting colony is delineated by the outer-most nest trees of the colony.
3. **Recommendations.** The recommendations presented in this section are broad. They are an attempt to address the full range of possible situations that may arise when human activity influences wading bird rookeries. Where there is doubt about the interpretation or the application of these recommendations, it is strongly recommended that the appropriate MDIFW regional wildlife biologist be contacted for assistance.

Alteration of existing natural habitat within a rookery and land use changes within 1/4 of a mile of the perimeter of a rookery can have a significant impact on future welfare of a wading bird colony. In managing wading bird colonies, recommendations have been developed for the nesting colony and for three concentric buffer zones around it.

The natural habitat within 330' of the colony should not be modified unless such actions are deemed essential to improve or maintain nesting opportunity by an MDIFW wildlife biologist. Human use of the area should be discouraged during the critical nesting period (April 1 - August 15).

Incompatible year-round activities:

- Timber cutting without consultation with an MDIFW wildlife biologist,
- Land clearing without consultation with an MDIFW wildlife biologist, and
- Road, trail, or building construction.

Incompatible activities during the nesting period:

- Repeated human visitation.

Compatible Activities during the non-nesting period:

- hiking, fishing (recreational and commercial) and agricultural activities.

The area 330-660 feet from the colony perimeter should be limited to light land-use activities conducted only during the non-critical nesting period. Timber harvesting should not remove more than 20% of the available stand volume in any 10-year period in this zone. Stand openings created by cutting should be distributed evenly and each should not exceed an area of 7,500 square feet.

Incompatible year-round activities:

- Clear cutting,
- Land clearing (openings greater than 7,500 square feet), and
- Building permanent structures, roads, or trails.

Compatible activities during the critical nesting period:

- Minimal human activity, and
- Farming or commercial fishing if MDIFW wildlife biologists have found that nesting birds are tolerant of these activities.

Compatible activities during the non-nesting period:

- Hunting, fishing, hiking, farming,
- Selective thinning or maintenance of timber stands using the guidelines stated above, and
- Maintenance of existing roads or trails.

The area 660-1,320 feet from the colony perimeter should also be protected from human disturbance. The construction of buildings and roads in this zone can impact the rookery. If the construction of a road or building appears warranted, a MDIFW wildlife biologist should be consulted prior to its beginning. Specific sites valuable to wading birds (perching areas or potential nest trees) should be preserved, but there are no other land use restrictions for activities conducted during the noncritical period.

Because the effects of human disturbance to a colony depend on several factors (including the stage of the nesting cycle, habituation to human activity, size of colony and type of habitat surrounding the colony), any subdivisions or industrial or commercial developments proposed within one mile of a heronry should be reviewed in consultation with MDIFW to assess potential effects to the colony.

E. BALD EAGLE NEST SITES

1. **Sensitivity.** The bald eagle is the largest bird in Maine, having a wingspan of 7 to 8 feet and weighing from 8 to 15 pounds. They attain their adult plumage (a white head and tail) at 5 years of age, at which time they choose a mate for life. Bald eagles build large stick nests usually in prominent white pines or spruces located within one mile of marine habitats, shallow lakes and ponds, or along larger rivers. A pair of eagles returns to the same nest site yearly and will sometimes maintain up to 7 nests within their nesting territory. Bald eagles eat primarily bottom-dwelling fish during the summer months, but shift their diet to birds (primarily waterfowl and gulls) and carrion during the winter. Adult eagles remain near their nest year-round, however, young eagles may wander as far south as Chesapeake Bay before returning to Maine to nest. Eagles from Maine and the region from the Maritime Provinces and Ontario to Saskatchewan are known to winter in Maine. In addition to nesting areas, bald eagles require perch sites and winter roost sites located near feeding areas.

The bald eagle was declared an Endangered Species on the Federal Register in Maine and 43 other states in 1978, and is listed as endangered on the State of Maine Endangered Species List. Maine has the only nesting population of bald eagles in New England. In 1986, 85 pairs of eagles were found nesting in Maine and they produced 75 young. Reproductive rates in Maine remain lower than other populations in North America. However, because of the increased survival of young eagles, due in part to a winter feeding program, the population is still increasing. Protection of traditionally used nesting territories is a key factor in the long-term recovery of Maine's bald eagle population.

Human influences such as disturbance around nest sites, shooting, environmental pollution, and habitat alteration have affected bald eagle populations. Bald eagle numbers in Maine began a slow but steady decline in colonial times, primarily as the result of habitat loss and human persecution. This decline was greatly accelerated in Maine after 1945, when DDT and other organochlorine pesticides were used extensively for spruce budworm and agricultural pest control. These pesticides caused reproductive failure in many birds of prey, and were banned from use in

North America in 1972. Bald eagles and other birds of prey have since responded with improvements in their reproductive success. Because of slow decomposition rates in Maine's forest soils, DDT still adversely influences the production of some pairs.

Nevertheless, Maine's bald eagle population continues to produce more young each year. New breeding pairs of bald eagles in Maine have been found in recent years, and most often resume use of historic nest sites that were abandoned in the 1950's and 1960's.

Today, a tremendous increase in land development and recreation is occurring in mid and eastern coastal regions, and has already modified western coastal areas formerly occupied by nesting eagles. Habitat protection and management, particularly at and adjacent to the nest site, are essential to the recovery of bald eagles in Maine.

2. **Methods.** Annual aerial surveys are conducted in April to check historical and/or known active territories for use and to verify reports obtained during the previous year. Historic nest sites which continue to have suitable habitat were mapped even if not active in recent years.
3. **Recommendations.** New development and associated human activity within 1/2 mile of an active eagle nest can impact nesting success, and the maintenance of local bald eagle populations. The recommendations presented in this section are broad. They are an attempt to address the full range of possible situations that may arise when human activity influences bald eagle nest sites. Where there is doubt about the interpretation or the application of these recommendations, it is strongly recommended that the appropriate MDIFW regional wildlife biologist be contacted for assistance.

Eagles have a prolonged nesting season during which they are extremely sensitive to disturbance. Any activities near the nesting territory may be harmful from the time adults arrive at a nest to the period when young eaglets disperse in late summer.

General dates for this critical period are:

Coastal Maine - February 1 - August 31
Interior Maine - March 1 - September 30

The first 2 months of the nesting season (courtship, nest repair, egg-laying, incubation, and hatching) are especially critical, and disturbances may cause nesting failure or even abandonment. Adult eagles may occupy nesting territories throughout the year, particularly in coastal regions.

Protection recommendations consist of three concentric buffer zones which become less restrictive as the distance from the nest increases. This conforms with the protection suggested in national recovery plans for bald eagles. Suggested shoreland zoning districts are those defined by the Maine Shoreland Zoning Act.

The area 330 feet from the nest should be maintained as an undisturbed nesting sanctuary. The natural habitat should be protected unless such actions are deemed essential to site preservation by an MDIFW wildlife biologist. Recreational activities (hunting, fishing, hiking, boating) should be discouraged during the critical nesting period.

Incompatible year-round activities:

- Timber cutting without consultation with an MDIFW wildlife biologist,
- Land clearing without consultation with an MDIFW wildlife biologist,
- Road, trail, or building construction, and
- Repeated human visitation.

Compatible activities during the non-nesting period:

- hiking, fishing (recreational and commercial), and agricultural activities.

The area 330-660 feet from the nest should be limited to light land-use activities conducted only during the non-critical period. Any timber harvests should not remove more than 20% of the available stand volume in any 10-year period in this zone. Stand openings created by cutting should be distributed evenly and each should not exceed an area of 7,500 square feet.

Incompatible year-round activities:

- Clear cutting,
- Land clearing (openings greater than 7,500 square feet), and
- Building permanent structures, roads, or trails.

Compatible activities during the critical nesting period:

- Human activity, if minimized, and
- Farming or commercial fishing is possible if MDIFW wildlife biologists have found that nesting eagles are tolerant of these activities.

Compatible activities during the non-nesting period:

- Hunting, fishing, hiking, & agriculture,
- Selective thinning or maintenance of timber stands using the guidelines stated above, and
- Maintenance of existing roads or trails.

The area 660-1,320 feet from the nest should also be protected from human disturbance, and specific sites valuable to eagles (perching areas or potential nest trees) preserved. Construction of buildings and roads in this zone will likely affect the suitability of the nest site.

If construction of roads or buildings appears warranted, a wildlife biologist should be consulted prior to their beginning. Buildings and roads should be out of the line of sight from the nest and conform to at least a 100-foot setback from the shoreline. The integrity of the shoreline vegetation should be maintained by restricting cutting along the shoreline and large snags should be retained for perch trees.

Eagle nests may be affected by activities more than 1320 feet from the nest and activities beyond 1320' from the nest may impact nesting success. individual basis.

Other recommendations:

- 1) A supply of mature trees should be maintained in the area since eagles prefer old-growth trees to perch and build their nests. Tall white pines are the favored nest and perch trees for eagles in Maine.
- 2) Nearby shorelines offering perch trees are an important component of the nesting habitat and should be preserved in a natural state. These restrictions generally conform with local Shoreland Zoning ordinances.
- 3) Site enhancement measures (e.g. posting, making snags available as perch trees, structural bracing of a nest in poor condition, and even building an artificial nest) are feasible and can be evaluated on a site by site basis.
- 4) Maine's coastal bald eagle population is presently expanding westward, recolonizing historic territories. Areas with documented use by nesting bald eagles since the first systematic eagle surveys began in 1962, should therefore be protected from major habitat alterations and large scale human development.

F. OSPREY NEST SITES

1. **Sensitivity.** The osprey or "fish hawk" is a common bird of prey in Maine, and has a wingspan of 4½ to 6 feet. In flight, ospreys are distinguished from bald eagles by their white underparts, a dark patch at the sharp bend or "wrist" of the wings, and their habit of hovering before diving into the water to capture fish. They attain maturity at 3 years of age, at which time they choose a mate for life and begin building a large stick nest that they will return to annually. Osprey nests are typically near water, atop snags or live trees having dead, broken tops, but they occasionally nest on exposed rock ledges. Some ospreys are tolerant of human activity and build their nests on channel markers, utility poles and towers, and artificial platforms. A pair of ospreys may maintain 2 or 3 nests within their territory, selecting one to nest in each spring. At some sites in Maine, ospreys nest in colonies of 2 to 11 pairs. In the fall, both adults and young migrate to Central and South America, going as far south as Argentina and Chile. The young birds remain there until maturity; then they return to nest near their place of birth.

The osprey population in Maine, as in many other regions of North America, is recovering from a dramatic decline. Like bald eagles, ospreys are extremely sensitive to environmental contaminants. Ospreys are still classified as endangered in 8 states and threatened in 20 others. However, because of their greater reproductive rates and higher tolerance of human activity, the osprey population in Maine has increased dramatically during the last decade. Survival of these birds depends increasingly on the species' ability to associate with humans. Nesting habitat adjacent to foraging areas continues to be lost, and many birds are forced to adapt to man-altered habitats. As a result, public awareness of ospreys has increased in recent years, and entire communities are now participating in osprey management projects, including artificial nest programs and protection of natural nest sites.

2. **Methods.** Nests were located during a 1981 aerial survey specifically for osprey (only part of study area), the 1981 or 1982 coastal aerial surveys, and the ground surveys of seabird nesting islands. Osprey nest locations are most likely incomplete because there is a regular turnover of nest sites by ospreys.

3. **Recommendations.** The recommendations presented in this section are broad. They are an attempt to address the full range of possible situations that may arise when human activity influences osprey nest sites. Where there is doubt about the interpretation or the application of these recommendations, it is strongly recommended that the appropriate MDIFW regional wildlife biologist be contacted for assistance.

The strong recovery of osprey populations in most parts of Maine; the birds' versatility of nest site selection, and the large turnover rates of nest sites, indicate that intensive site specific management is not required. As a general rule, during the critical nesting period disturbance to osprey nests should be discouraged. General dates for the critical nesting period are:

Coastal Maine: April 1 to August 15
Interior Maine: April 15 to August 15

The first 2 months of the nesting season (courtship, nest repair, egg laying, incubation, and hatching) are the most critical. Disturbances that cause an incubating or brooding bird to flush from the nest can cause nesting failure. Ospreys use a loud chirping call or will even attack when visitors venture too close to the nest. These behaviors should be sufficient warning to leave the nesting area. Signs warning the public to maintain respectable distances from nesting birds should be erected.

During the critical nesting period, human activity should be minimized and should exclude construction of major roads and buildings within 660' of an active nest. Ospreys are variable in the amount of human disturbance they will tolerate. Generally, pairs that build nests in close proximity to buildings, roads, or on bridge piers, chimneys, channel markers, or utility poles have accepted human activity, and recommendations may be modified in consultation with an MDIFW wildlife biologist. Most activities are acceptable in this zone outside of the critical nesting season except construction of major roads and buildings. If construction of a road or building appears warranted, an MDIFW wildlife biologist should be consulted prior to its beginning. Buildings and roads within the zone and adjacent areas should be out of sight from the nest and conform to a 100 foot or greater setback

from the shoreline. The integrity of the shoreline vegetation should be maintained by restricting cutting and retaining large snags along the shoreline protection zone.

Selective cutting within 660 feet of a nest is acceptable outside of the critical nesting period, but harvest should not remove more than 20% of the stand volume in any 10-year period. A special effort should be made to preserve snags and clumps of tall trees for alternate nest sites.

Incompatible year-round activities:

- Clear cutting, and
- Building permanent structures and major roads (see comments above).

Compatible activities during the critical nesting period:

- human activity, if minimized, and
- Farming or fishing (commercial or recreational) is possible if nesting ospreys are tolerant of these activities.

Compatible activities during the non-nesting period:

- Hunting, fishing, hiking, farming,
- Selective harvesting of forest stands, and
- Maintenance of existing roads or trails.

Colonial groupings of osprey nests (occupied nests separated by less than 1/2 mile) should be buffered collectively. The guidelines outlined above should be applied to each individual nest, and the colony boundaries should be delineated by a MDIFW wildlife biologist. Colonial nesting ospreys are rare in Maine and indicate the proximity of a unique, highly productive feeding area or a severe shortage of suitable nesting habitat.

Additional recommendations include:

- 1) A supply of mature trees and snags should be

maintained along the shoreline for potential nest sites. Tall white pines and broken-topped spruces are favored nest and perch trees for ospreys in Maine.

- 2) Maintaining the integrity of wooded shorelines greatly enhances osprey nesting and perching habitat. Minimum setbacks of 100 feet or greater for building or road construction along a wooded shoreline not only complies with shoreland zoning ordinances but lessens the influence of new construction on ospreys, eagles and other wildlife. Suggested shoreland zoning districts are those defined by the Maine Shoreland Zoning Act. Shoreline buffers greater than those provided for under Shoreline Zoning may be recommended based on other adjacent resource areas, such as wetlands (W3, W2) or Class A Marine Wildlife Habitats.
- 3) Community artificial nest platform programs have been successful for ospreys. Artificial platforms can be used to provide nest sites in areas that lack sufficient natural sites, replace insecure natural nests, relocate nests away from excessive disturbance, and substitute nests located on hazardous or conflicting man-made structures. The design and placement of nest platforms should be under the direction of a MDIFW wildlife biologist.

G. SHOREBIRD FEEDING AND ROOSTING AREAS

1. **Sensitivity.** Shorebirds are a closely related group of species that are represented in Maine by the sandpipers, plovers, turnstones, curlews, dowitchers, and phalaropes. The Maine coast is an important feeding and resting area for over 25 species of migratory shorebirds. Six species, including the endangered piping plover, breed along the coast, and one species, the purple sandpiper, is a winter resident.

A large numbers of these birds depend on coastal habitats in Maine for feeding and resting during their long migration from the Arctic breeding grounds to South American wintering areas. During their brief stay in Maine, most shorebirds feed intensively on intertidal invertebrates and nearly double their weight in fat reserves. This fat is used as fuel for the nonstop 2,600 mile transoceanic flight. Although migratory shorebirds are observed briefly in Maine (from July to September), the coastal habitats they use are critical to the continued success of their annual migrations.

Shorebird populations are still recovering from tremendous population declines incurred in the late 1800's and early 1900's resulting from market hunting. Several species, including the Eskimo curlew, golden plover, and whimbrel, are still rare today. However, the continued recovery of all shorebird species depends particularly on the preservation of fall migration areas (Maine and the Bay of Fundy region), wintering quarters (coastal South America) and spring migration stopovers (central U. S. and Canada).

2. **Methods.** Historic records and ground surveys were used to locate shorebird feeding and roosting areas. Presence of an average of 50 or more shorebirds during any season was needed to locate one of these areas.
3. **Recommendations.** The recommendations presented in this section are broad. They are an attempt to address the full range of possible situations that may arise when human activity influences shorebird feeding and roosting areas. Where there is doubt about the interpretation or application of these recommendations, the appropriate MDIFW regional wildlife biologist should be contacted for assistance.

The continued importance of the Maine coast to migrating shorebirds depends on the preservation of their feeding and roosting habitats. Commonly used feeding areas include mudflats, salt marshes, sand and gravel beaches, mussel bars, blueberry fields, and bogs. Major roosting habitats are gravel and sand beaches and bars, salt marshes, rocky ledges, fields, and pastures. Each species has preferred feeding and roosting habitats. The importance of a region to a particular species depends on the abundance of its preferred habitats in that region. In general, preservation of intertidal mud and sand flats, sand beaches and gravel bars would provide feeding and resting areas for a diversity of shorebird species.

Feeding Areas. Protection recommendations consist of applying the existing shoreland zoning districts (Maine Shoreland Zoning Act) to protect the most important shorebird feeding areas. Shoreline buffers greater than those provided for under shoreline zoning may be beneficial based on other adjacent resource areas, such as wetlands (W3, W2) or Class A Marine Wildlife Habitats [MWH(A)]. In addition, activities should be restricted that would substantially alter the integrity of the existing shoreline or influence the abundance or species composition of the intertidal invertebrate populations that the shorebirds utilize for food (e.g., dredging, filling, construction of piers, jetties, seawalls, discharge of human and industrial waste). Shorebirds may shift to other feeding areas if excessive alterations or destruction of intertidal habitats occur. Human activity should be discouraged during peak migration (July 10 to September 10). Activities that would diminish the intertidal invertebrate diversity or abundance should be prohibited year-round.

Compatible activities during the peak migration period:

- Light to moderate intensity clam or worm digging, commercial fishing (except dragging), and recreational activities.

Incompatible year-round activities:

- Overboard discharge of sewage or other environmental contaminants on or near mud or sand flats used by shorebirds, and

- Activities such as dredging or filling on feeding areas, or dragging within 1/2 mile of mean low tide of feeding areas that would cause deposition of sediment especially in Class A and B wildlife areas.

Most other activities are compatible with shorebird feeding areas outside of the migratory period, except dredging, filling, or dragging. Building and road construction, forestry and agricultural activities should be out of the line of sight from the feeding area and conform to at least a 75 foot or greater setback from the shoreline.

Roosting Areas. Roosting habitats are extremely limited and highly traditional. The physical characteristics of a roost site offer shorebirds protection from adverse weather and predators, in addition to a place to rest at high tide. Good roost sites are limited and shorebirds will travel for miles to a well-protected roost at high tide. Many roosting areas have been used by shorebirds since colonial times.

The natural habitat within shorebird roosting area and adjacent shoreland within 250' of each roosting area should not be modified unless such actions are deemed essential to site preservation after consulting with a MDIFW wildlife biologist.

Incompatible year-round activities within 250-foot protection zone:

- Land clearing without consultation with a MDIFW wildlife biologist, and
- Road, trail, or new building construction.

Incompatible activities within 250-foot protection zone during the migratory period:

- Human activities (Posting of the area may be warranted).

Compatible activities during the non-migratory period:

- Hunting, fishing, hiking, commercial fishing, and farming, and
- Selective thinning or maintenance of timber stands within the 250 foot zone.

H. SEAL HAUL-OUTS

- A. **Sensitivity.** Maine has the largest population of harbor seals of any Atlantic state, and supports the only significant breeding population in the eastern United States. Gray seals, which are much larger than the harbor seal, are uncommon but regular visitors to Maine's coast, and usually found around remote offshore ledges and islands. The gray seal does not breed in Maine. Although pups are occasionally seen, they have probably dispersed from their birthplaces around Sable Island or the Gulf of St. Lawrence in eastern Canada.

Populations of both species were severely depleted by overharvesting through the middle part of this century, but have increased dramatically during the past twenty years in response to protective legislation. Maine's population of harbor seals has more than doubled since 1973, to an estimated 13,000 plus animals in 1986 (Gilbert and Stein, 1981; Wynne, personal communication).

All seals use half-tide ledges and island beaches for resting and whelping, and these sites are necessary for the survival of both adults and young. Whelping or "pupping" sites are used from year to year by the same breeding females, many of which were probably born on these ledges (Cowperthwaite, unpubl. data). These specific sites are important because of their proximity to high quality feeding areas, combined with a lack of human disturbance.

The attributes of food availability and lack of disturbance also determine selection of haul-out ledges by nonbreeding and post-breeding seals (Ronald, Selley and Heally, 1982). Adult seals undergo a complete pelage molt in mid to late summer. This is a physiological stressful period demanding additional rest to sustain the increased metabolic activity associated with skin and fur replacement.

2. **Methods.** Seal haul-outs were located in conjunction with coastal aerial surveys in 1981 or 1982 and ground censuses of seabird nesting islands. Seal haul-outs observed with at least 5 or more adults or pups were mapped.
3. **Recommendations.** The recommendations presented in this section are broad. They are an attempt to address the full range of possible

situations that may arise when human activity influences seal haul-outs. Where there is doubt about the interpretation or the application of these recommendations, the appropriate MDIFW regional wildlife biologist be contacted for assistance.

Human disturbance and contamination from oil spills are the primary threats to seals at haul-outs. Curious boaters approaching too close to hauled-out seals, or actually landing on the islands and ledges, will force seals to flee into the water. Young pups can easily become permanently separated from their mothers, resulting in death by starvation. Pups are born without a thick layer of blubber, and must rely on solar energy for thermoregulation during the first few weeks of life. Until pups have acquired a layer of blubber, long periods of immersion in Maine's cold coastal waters can cause death from hypothermia. Curious pups are also slow to avoid boats, and are therefore vulnerable to injuries from boat propellers.

The hazards to marine mammals from oil spills are well-documented. Ingestion of petroleum products, and oiling of fur can cause death. Spills in proximity to major pupping areas could be especially disastrous, affecting hundreds of seals.

Recommendations for the protection of seal haul-outs focus on minimizing both exposure to human disturbance and the potential for involvement with major oil spills.

Human activity should be discouraged during the critical period of **April 1 - August 15**. Informational signs should be posted at major boat launching areas and marinas explaining the problems of human disturbance to seals, and requesting that boaters avoid harassment by remaining at least 200 feet from all seals, whether hauled-out or in the water. Siting of major marinas and oil tanker shipping lanes should avoid important haul-out areas.

I. LEAST TERN AND PIPING PLOVER NEST SITES

1. **Sensitivity.** The least tern and piping plover both nest along the Atlantic coast on sandy, coastal beaches. Both are rare and their populations have been declining in recent years. The piping plover is federally listed as Threatened throughout its Atlantic coast range. In Maine the piping plover and least tern are listed as Endangered.

There currently are fewer than 100 pairs of least terns nesting in Maine and fewer than 15 pairs of piping plovers. There are only about 12 beaches in Maine where suitable nest sites for these birds exist. At all of the nesting sites, birds are confronted with habitat loss, disturbance from people and their pets, and predation from wild animals and pets. To prevent the loss of these two species from Maine, undisturbed nest sites must be available.

2. **Methods.** Historic potential and known active nesting sites are annually surveyed by Maine Audubon Society and by MDIFW. These records form the basis of all mapped sites.
3. **Recommendations.** Specific recommendations for these species are being developed by the U.S. Fish and Wildlife Service but are not available at this time. However, nesting beaches should not be developed and human disturbance and pets should not be allowed in the nesting areas. MDIFW wildlife biologists should be contacted for specific recommendations on a site-by-site basis.

J. OTHER SPECIAL WILDLIFE HABITATS

1. **Sensitivity.** A number of other special wildlife habitats exist for which there are currently no broad recommendations due to their uniqueness. An example is the grasshopper sparrow nest site in Brunswick. These unique habitats are grouped within this "OTHER" category for the purposes of this report. They should be viewed as extremely sensitive environments.
2. **Methods.** Confirmed occurrences of endangered or threatened wildlife species utilizing a specific location to fulfill all or a portion of their seasonal or annual needs for food, cover and reproduction were mapped in this category. A complete list of endangered and threatened wildlife species is found in Appendix 7.
3. **Recommendations.** MDIFW wildlife biologists should be contacted to assist in developing specific management plans.

Part II. OPEN SPACE FOR WILDLIFE

1. **Sensitivity.** A model for evaluating open space for wildlife has immediate value in southern Maine. Currently biologists are faced with determining how particular development projects will affect the full range of wildlife species without having a way to determine the land's relative value. A standardized evaluation method is essential so that development may be directed towards appropriate areas and away from critical wildlife habitats. It provides a link between scientific information currently available and the needs of planners. The model contained in this report should not be used to predict animal occurrence or abundance within habitats.
2. **Methods.** A four-step procedure was developed for evaluating open space for wildlife (Appendix 8). The method is similar to one applied by Woodward et al. (1986) for evaluating wildlife habitat in coastal Maine and is based on models used by the U.S. Fish and Wildlife Service (1980a, 1980b). Steps I and II incorporate the first four guidelines recommended by the U. S. Fish and Wildlife Service (1980a) for developing indices of suitable habitat prior to site visits. These guidelines are: 1) define the study area boundaries, (2) develop species guilds (here called habitat types), 3) calculate total availability of habitat, and 4) acquire habitat suitability models. The model selected uses existing information and expert opinion on species diversity and abundance to assess the biological value of habitats and is described in step I. Step II alters the biological value of each habitat by increasing the value of rare habitats relative to more abundant habitats within the study area. This is accomplished by combining information on habitat availability with the data on species diversity and abundance and calculating an index for habitats within the study area.

Step III provides an on-site procedure for determining the overall value of a specific site based on steps I and II, and assesses the value of special components present at the site as observed during a field visit.

Step IV provides a procedure to evaluate additional values if an area is being considered for development.
3. **Recommendaitons.** Although no areas were evaluated in these towns as part of this project, the procedure has been used by MDIFW to evaluate areas throughout the state for acquisition. The habitat evaluation form is found as Appendix 9.

VI. CONCLUSION

Wildlife and fisheries values for each of the 17 study towns were based on the best available information. In some cases, significant resources may not have been included because of insufficient available documentation. An area's absence from this report by no means precludes it from being identified as important at a later date. Areas that may have significant fish and wildlife resources that do not appear in this report should be evaluated by a professional wildlife biologist before they are significantly altered.

The dramatic increase in growth in many Maine communities has caused wildlife habitat to be lost to development. Most of the burden of guiding or controlling growth has fallen on local officials who are usually serving only part time or as volunteers. Although local officials are often most informed about what developments are occurring in their towns, they frequently lack the expertise or resources to evaluate the affect on wildlife.

This report was designed to provide information regarding the protection of special fish and wildlife habitats. South-coastal Maine was selected for in-depth analysis due to the intense development pressures currently occurring.

Many questions remain concerning the best way to implement the management recommendations for preserving important wildlife and fisheries habitats. This report has accomplished the initial steps in the process by identifying the resources requiring special consideration, as well as providing initial recommendations regarding the protection of these natural resources.

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Appendix 1. Common and Scientific Names of Fish and Wildlife Species in this Report

Name	Common Name	Scientific
Birds:		
	Great Blue Heron	<u>Ardea herodias</u>
	Snowy Egert	<u>Leucophoyx thula</u>
	Glossy Ibis	<u>Plegadis falcinellus</u>
	Black-Crowned Night Heron	<u>Nycticorax</u> <u>nycticorax</u>
	Tri-Colored Heron	<u>Florida coerulea</u>
	Little Blue Heron	<u>Brauta canadensis</u>
	Canada Goose	<u>Anas platyrhynchos</u>
	Mallard	<u>Anas rubripes</u>
	American Black Duck	<u>Somateria mollissima</u>
	Common Eider	<u>Melanitta nigra</u>
	Black Scoter	<u>Melanitta fusca</u>
	White-winged Scoter	<u>Melanitta</u>
	Surf Scoter	<u>perspicillata</u>
	Harlequin Duck	<u>Histrionicus</u> <u>histrionicus</u>
	Oldsquaw	<u>Clangula hyemalis</u>
	Common Goldeneyes	<u>Bucephala clangula</u>
	Bufflehead	<u>Bucephala albeola</u>
	Common Merganser	<u>Mergus merganser</u>
	Red-breasted Merganser	<u>Mergus serrator</u>
	Black Guillemot	<u>Cepphus grylle</u>
	Atlantic Puffin	<u>Fratercula arctica</u>
	Razorbill Auk	<u>Alca torda</u>
	Great Cormorant	<u>Phalacrocorax carbo</u>
	Leach's Storm Petrel	<u>Oceanodroma</u> <u>leucorhoa</u>
	Purple Sandpiper	<u>Erolia maritima</u>
	Eskimo Curlew	<u>Numenius borealis</u>
	Golden Plover	<u>Pluvialis dominica</u>
	Whimbrel	<u>Numenius phaeopus</u>
	Piping Plover	<u>Charadrius melodus</u>
	Least Tern	<u>Sterna antillarum</u>
	American Woodcock	<u>Scolopax minor</u>
	Sharp-shinned Hawk	<u>Accipiter striatus</u>
	Cooper's Hawk	<u>Accipiter cooperii</u>
	Bald Eagle	<u>Haliaeetus</u> <u>leucocephalus</u>
	Osprey	<u>Pandion haliaetus</u>
	Ruffed Grouse	<u>Bonasa umbellus</u>
	Eastern Kingbird	<u>Tyrannus tyrannus</u>
	Yellow Warbler	<u>Dendroica petechia</u>

Common Yellowthroat
Grasshopper Sparrow

Song Sparrow

Geothlypis trichas
Ammodramaus
savannarum
Melospiza melodia

Mammals:

Coyote
Red Fox
Marten
Fisher
Bobcat
Whitetailed Deer

Harbor Seal
Gray Seal

Canis latrans
Vulpes vulpes
Martes americana
Martes pennanti
Lynx rufus
Odocoileus
virginianus
Phoca vitulina
Halichoerus grypus

Fish:

American Eel
Banded killifish
Black crappie

Blacknose dace

Blacknose shiner
Bridle shiner
Brook stickleback
Brook trout

Brown bullhead
Brown trout
Burbot
Chain pickerel
Common shiner
Creek chub

Creek chubsucker
Fallfish
Finescale dace
Golden shiner

Lake chub
Lake trout
Lake whitefish

Landlocked salmon
Largemouth bass

Longnose sucker

Ninespine stickleback
Northern redbelly dace

Anquilla rostrata
Fundulus diaphanus
Pomoxis
nigromaculatus
Rhinichthys
atratus
Notropis heterolepis
Notropis bifrenatus
Culaea inconstans
Salvelinus
fontinalis
Ictalurus nebulosus
Salmo trutta
Lota lota
Esox niger
Notropis cornutus
Semotilus
atromaculatus
Erimyzon oblongus
Semotilus corporalis
Phoxinus neogaeus
Notemigonus
crysoleucas
Couesius plumbeus
Salvelinus namaycush
Coregonus
clupeaformis
Salmo salar
Micropterus
salmoides
Catostomus
catostomus
Pungitius pungitius
Phoxinus eos

Pumpkinseed sunfish
Rainbow trout
Slimy sculpin
Smallmouth bass

Threespine stickleback

White perch
White sucker

Yellow perch

Lepomis gibbosus
Salmo gairdneri
Cottus cognatus
Micropterus
dolomieu
Gasterosteus
aculeatus
Morone americana
Catostomus
commersoni
Perca flavescens

Appendix 2. Township Summaries

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Town: Bath

Fisheries Habitat (inventory #)

Rating

	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
1) Brooks and Streams:				
Unnamed Brook (0840000000)			*	
Whiskeag Creek		*		
Unnamed Brook (0820000000)			*	
2) Lakes and Ponds:				
Lilly Pond		*		
Winnegance Lake		*		

Wildlife Habitat

1) Deer Wintering Areas:

None Observed

2) Wetlands:

West of Fairview Cemetary				*
North of Fairview Cemetary				*
East of Washington Street			*	
1 Mile West of Washington St.			*	
Maple Grove Cemetary				*
Whiskeag Creek		*		
Whiskeag Creek	*			
1 Mile West of Oak Grove Cemetary				*
East of North Bath Road	*			
Crawford Island	*			
Lines Island	*			
East of Varney Mill Rd.	*			
South of Butter Cove				*

3) Marine Wildlife Habitats:

Classification

	<u>A</u>	<u>B</u>	<u>C</u>
Androscoggin River	*		
Winnegance Creek	*		
Lines Island	*		
Merrymeeting Bay	*		
Androscoggin Flats	*		
Butler Cove		*	
Trufant Ledge			*
Whiskeag Creek			*

Bath (cont.)

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

None Observed

2) Wading Bird Rookeries:

None Observed

3) Bald Eagle Nest Sites (historic):

1 pair using:

Crawford Island (2 nests)
Merrymeeting Bay

1 pair using:

Butler Cove
West Chops Point

4) Osprey Nest Sites:

West Branch

5) Shorebird Feeding and Roosting Areas:

Winnegance Creek

6) Seal Haul-Outs:

None Observed

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

None Observed

Town: Biddeford

Fisheries Habitat (Inventory #)

Rating

	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
1) Brooks and Streams:				
Unnamed Brook (0320070100)	*			
Swan Pond Brook	*			
Richardson Brook		*		
Thatcher Brook		*		
West Brook		*		
Dungeon Brook			*	
Moors Brook			*	
Little River		*		
Bush Brook		*		
Goff Mill Brook		*		
Brimstone Pond Outlet		*		
Unnamed Brook (0320070300)				*
Unnamed Brook (0320070301)				*

2) Lakes and Ponds:

None Observed

Wildlife Habitat

1) Deer Wintering Areas:

Bush Brook		*
Little River		*
Dungeon Brook	*	
Swan Pond & Thatchers Brook	*	

2) Wetlands:

N of I-95 on Thatcher Brook	*		
1/2 mile E of I-95		*	
Thatchers Brook adj. to			
Saco River		*	
1/4 mi. SW of St. Mary's			
Cemetery			*
E of Wilcox Pond			*
Wilcox Pond			*
S of Proctor Road			*
N of Proctor Road			*
Saco River - W	*		
Saco River - E	*		
W of Newtown Road			*
Behind Cutris Cove	*		
E of Bush Brook			*
Etherington Pond	*		
S of Biddeford Pool	*		
E of Biddeford Pool	*		
NW of Biddeford Pool	*		
Biddeford Pool	*		

Biddeford (cont.)

3) Marine Wildlife Habitats

Not Surveyed

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

Negro Island
Wood Island
Stage Island
Beach Island
Gooseberry Island

2) Wading Bird Rookeries:

Wood Island

3) Bald Eagle Nest Sites:

None Observed

4) Osprey Nest Sites:

None Observed

5) Shorebird Feeding and Roosting Areas:

Little River
Fortunes Rock Cove
The Pool
Saco River (mouth)
Saco River (Chandler Point)
New Barn Cove
Fortunes Rock Beach
Hills Beach
Saco River (Edgecomb Point)
Marsh south of Hills Beach

6) Seal Haul-Outs (Incomplete Survey):

Beach Island
Gooseberry Island

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

.None Observed

Town: Brunswick

Fisheries Habitat (inventory #)

Rating

1) Brooks and Streams:	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
Unnamed Brook (0860070000)		*		
Unnamed Brook (0860050000)			*	
Unnamed Brook (0860020000)			*	
Unnamed Brook (0860010000)		*		
Mare Brook		*		
Miller Brook			*	
Unnamed Brook (0580000000)			*	
Unnamed Brook (0600000000)				*
Simpson Brook			*	
Unnamed Brook (0560000000)			*	
Bunganuc Brook			*	
Collins Brook				*
Kelsey Brook			*	
Mills Stream		*		

2) Lakes and Ponds:

None Observed

Wildlife Habitat

1) Deer Wintering Areas:

Brunswick NAS/Coombs Road	*			
New Meadows River			*	
Bunganuc Stream	*			
N of Durham Road		*		
S of Durham Road			*	
Bald Rock/Florida Lake	*			

2) Wetlands:

Maquoit Bay	*			
North-end Maquiot Bay	*			
Rossmore Road			*	
New Bay Cove	*			
Northend New Bay Cove	*			
NW Buttermilk Cove	*			
Mare Brook		*		
NW Woodward Cove		*		
New Meadows Center				*
1/4 me. S Cooks Corner				*
New Meadows River N-end	*			
New Meadows River -Head of Thomas Bay		*		

Brunswick (cont.)

	Rating			
	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
2) Wetlands (cont.):				
Androscoggin River			*	
1 mi. N Brunswick NAS				*
1 mi. N Durham Road				*
NW of Hacker Road				*
SE of Hacker Road			*	
3) Marine Wildlife Habitats:	Classification			
	<u>A</u>	<u>B</u>	<u>C</u>	
Maquoit Bay	*			
White Island Flats	*			
Middle Bay Cove	*			
Androscoggin River	*			
Androscoggin Flats	*			
Long Reach		*		
Coombs Island area		*		
Middle Ground/Thomas Bay		*		
Birch Island				*
Harpswell Cove				*
Upper New Meadows				*

Special Wildlife Features (No ratings or classification performed)

- 1) Colonial Nesting Seabird Islands:

None Observed
- 2) Wading Bird Rookeries:

None Observed
- 3) Bald Eagle Nest Sites:

None Observed
- 4) Osprey Nest Sites:

East of Prince Point
Lower Coombs Island
Iron Island
Upper Coombs Island
Woodward Cove
- 5) Shorebird Feeding and Roosting Areas:

Thomas Bay
Middle Bay Cove
Harpswell Cove
Maquoit Bay

Brunswick (cont.)

6) Seal Haul-Outs:

None Observed

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

Grasshopper Sparrow (Endangered Species) nest site.
pitch pine - scrub oak habitat with associated uncommon moth
species (Xylena thoracica)

Town: Cape Elizabeth

Fisheries Habitat (Inventory #)

Rating

1) Brooks and Streams:	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
Pollack Creek			*	
Unnamed Brook (0350030000)			*	
Willow Brook			*	
Little Pond Outlet			*	
Unnamed Brook (0370000000)			*	
Alewive Brook			*	
Unnamed Brook (0390000000)			*	
Unnamed Brook (0400000000)			*	
Trout Brook			*	
Spurwink River				*

2) Lakes and Ponds:

Great Pond *

Wildlife Habitat

1) Deer Wintering Areas

Ram Island Farm *

Great Pond *

2) Wetlands:

Richmond Island *

Behind Breakwater Beach *

1/2 mi SE Spurwink Hill *

Little Pond *

1/2 mi N of Richmond Island *

Richards Pond *

Adj. to Richards Pond *

Great Pond *

Adj. to Great Pond *

Spurwink River Marsh *

N of Fowler Road *

S of Wells Road *

N of Wells Road *

Willow Brook *

Ficket Street *

Across from Eastman Rd. *

1/2 mi. N of Pond Cove (town) *

N of Pond Cove (tidal area) *

W of DeLano Park *

W of Fort Williams *

E of Trout Brook *

Cape Elizabeth (cont.)

3) Marine Wildlife Habitats

	Classification		
	A	B	C
Ram Island/Chimney Rock	*		
Higgins Beach	*		
Richmond Island/Seal Rock	*		
Spurwink River		*	
Portland Head			*
Trundy Ledge			*
Cape Elizabeth Head			*

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

Ram Island

2) Wading Bird Rookeries:

None Observed

3) Bald Eagle Nest Sites:

None Observed

4) Osprey Nest Sites:

None Observed

5) Shorebird Feeding and Roosting Areas:

Spurwink River
Richmond Island Harbor

6) Seal Haul-Outs:

Seal Rocks
Watts Ledge

7) Least Tern and Piping Plover Nest Sites:

Breakwater Beach (least terns)

8) Other Special Wildlife Habitats:

None Observed

Town: Cumberland

Fisheries Habitat (Inventory #)

Rating

1) Brooks and Streams:	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
Unnamed Brook (0450000000)			*	
Unnamed Brook (0430030500)		*		
Mill Brook			*	
East Br. Piscataqua River		*		
Unnamed Pd Outlet (0430030400)		*		
Hobbs Brook			*	
Piscataqua River	*			
Norton Brook			*	
Chenery Brook			*	

2) Lakes and Ponds:

Forest Lake *

Wildlife Habitat

1) Deer Wintering Areas:

E of Harris Road	*	
E of Harris Road by powerline		*
S of Range Road	*	
S of Cumberland Center	*	
NW of Blanchard Pond	*	
SW of Pleasant-Greeley Road extension		*
1 mi. S of W Cumberland		*
3/4 mi. E of W Cumberland	*	

2) Wetlands:

1/2 mi. E of Harris Road		*
N of Tuttle Road		*
S of Tuttle Road		*
Greely Road		*
1/4 mi. SE of Cumberland Center		*
1/4 mi S of Blanchard Road		*
1/4 mi. N of Ridge Road		*
1/4 mi. NE of W Cumberland		*
Piscataqua River 1/2 mi. N of W Cumberland		*
Piscataqua River 1/2 mi. E of W Cumberland		*
3/4 mi. SW of W Cumberland		*
3/4 mi. SW of W Cumberland		*
1 mi. NW of Bruce Hill		*
3/4 mi. NW of Bruce Hill	*	

Cumberland (cont.)

5) Shorebird Feeding and Roosting Areas:

None Observed

6) Seal Haul-Outs:

Lower Basket Ledge
Upper Basket Ledge
Seal Ledge
Upper Green Islands
Goose Nest Ledge
Stockman Island
Stave Island Ledge
Ministerial Island
Bates Island
Broken Cove

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

None Observed

Town: **Falmouth**

Fisheries Habitat (Inventory #)

Rating

	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
1) Brooks and Streams:				
Chenery Brook			*	
Norton Brook			*	
Unnamed Brook (0440010000)			*	
Mill Creek				*
Minnow Brook			*	
Meader Brook		*		
Unnamed Brook (0430030200)			*	
Piscataqua River	*			
Scitterygusset Creek			*	
Unnamed Brook (0430010000)			*	
Piscataqua River (east)		*		
Hobbs Brook			*	
Unnamed Pond Outlet		*		
Presumpscot River				*
2) Lakes and Ponds:				
Highland Lake	*			

Wildlife Habitat

1) Deer Wintering Areas:

Maine Turnpike/Falmouth Road	*
Maine Turnpike/Woodsville Road	*
E of Long Woods Road	*
1/4 mi. E of Gray Road	*
Off Hadlock Road	*
E of N Falmouth	*

2) Wetlands:

Portland Country Club		*		
N-end Presumpscot River	*			
Squidere Gusset			*	
3/4 mi. NE of Pleasant Hill				*
1 mi. NE of Pleasant Hill				*
1 mi. NE of Pleasant Hill				*
1 mi. NE of Falmouth High				*
1 mi. NE of Falmouth High				*
3/4 mi. E of Falmouth High				*
1 mi. E of Falmouth High				*
1/4 mi. S of Long Woods Road				*
Between I-95 and Presumpscot River			*	
1/2 mi. S of Long Woods Road				*
N of Dunham Road			*	

Falmouth (cont.)

	Rating			
	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
2) Wetlands (cont.):				
S of Dunham Road				*
Dunham/Cumberland Ctr. Roads Intersection				*
W of Cumberland Ctr. Road				*
1 mi. N of Huston School			*	
3/4 mi. S of Hadlock Road and Pine Tree Trail Intersection			*	
Brady Road				*
N of Poplar Ridge			*	
Highland Lake			*	
S of Highland Lake				*
E of Highland Lake				*

	Classification		
	<u>A</u>	<u>B</u>	<u>C</u>
3) Marine Wildlife Habitats:			
Presumpscot River	*		
Clapboard Island	*		
Mackworth Island Flats	*		
The Brothers		*	
Falmouth Foreside (north)			*
Sturdivant Island Ledges			*
Mussel Cove			*
Mackworth Island			*

Special Wildlife Features (No ratings or classification performed)

- 1) Colonial Nesting Seabird Islands:
 - Clapboard Island Ledges
- 2) Wading Bird Rookeries:
 - None Observed
- 3) Bald Eagle Nest Sites:
 - None Observed
- 4) Osprey Nest Sites:
 - None Observed
- 5) Shorebird Feeding and Roosting Areas:
 - Presumpscot River

Falmouth (cont.)

6) Seal Haul-Outs:

Sturdivant Island Ledges
Clapboard Island Ledges

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

None Observed

Town: Freeport

Fisheries Habitat (Inventory #)

Rating

	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
1) Brooks and Streams:				
Harvey Brook			*	
Merril Brook			*	
Unnamed Brook (0480000000)			*	
Unnamed Brook (0490000000)			*	
Unnamed Brook (0500000000)			*	
Unnamed Brook (0510000000)			*	
Frost Gully Brook			*	
Mill Stream	*			
Allen Range Brook			*	
Kelsey Brook			*	
Little River			*	
Unnamed Brook (0460060102)			*	
Collins Brook				*
Cousins River		*		

2) Lakes and Ponds:

None Observed

Wildlife Habitat

1) Deer Wintering Areas:

Harvey Brook *

2) Wetlands:

Cousins River		*	
Staples Cove		*	
N-end Haraseeket River	*		
Little River	*		
SE of Litchfield Road			*
1/2 mi. NW of N Freeport			*
1 mi. NE of N Freeport	*		

3) Marine Wildlife Habitats

Classification

	<u>A</u>	<u>B</u>	<u>C</u>
Williams Island area	*		
Maquiot Bay	*		
Lanes Island		*	
Cousins River/Royal River		*	
Harraseeket River		*	
Little Flying Point (South)		*	
Flying Point Cove			*
Moshier Island			*
French Island			*

Freeport (cont.)

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

French Island Ledge (North)
Little French Island
Sister Island Ledge

2) Wading Bird Rookeries:

None Observed

3) Bald Eagle Nest Sites:

None Observed

4) Osprey Nest Sites:

Googins Island
Sister Island
Williams Island
Pettingill Island
French Island
Sow and Pigs Island

5) Shorebird Feeding and Roosting Areas:

Cousins River
Harraseeket River

6) Seal Haul-Outs:

Googins Ledge
French Island Ledges
Pettingill Island
Bustins Ledge
Crab Ledge
Sister Island Ledge

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

None Observed

Town: Harpswell

Fisheries Habitat (Inventory #)

Rating

	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
1) Brooks and Streams:				
None Observed				
2) Lakes and Ponds:				
Impoundment Pond			*	

Wildlife Habitat

1) Deer Wintering Areas:

None Observed

2) Wetlands:

Union Church				*
1/2 mi. N of Long Point Island				*
Bethel Point				*
1/2 mi. N of Cundy's Harbor				*
Sebasco				*
Dyer Cove	*			
Adj. to Cundy's Harbor Rd.				*
1/2 mi. E of Cundy's Harbor				
Road				*
S of Oak Ledge				*
Adj. to Miser Hill				*
SE of Miser Hill				*
N of W Harpswell				*
S of Harpswell Center				*
Birch Island				*
1/2 mi. N of N Harpswell				*

3) Marine Wildlife Habitats

Classification

	<u>A</u>	<u>B</u>	<u>C</u>
Halfway Rock (not mapped-offshore)	*		
Eagle Island	*		
Goose Islands	*		
White Island Flats	*		
Middle Bay Cove	*		
Wilson Cove	*		
Ragged Island	*		
Mark Island	*		
White Bull Island	*		
Sisters	*		
Haddock Rock		*	
Mark Islands		*	
Potts Harbor		*	

Harpswell (cont.)

3) Marine Wildlife Habitats (cont.)	Classification		
	A	B	C
Harpswell (West)		*	
Dogs Head Bay		*	
Widgeon Cove		*	
Gun Point Cove		*	
Harpswell Harbor		*	
Bailey Island (East)		*	
Pond Island and Ledges		*	
Saddleback Ledges		*	
Jenny Island		*	
Duck Rock		*	
Cundy Harbor/Cedar Ledges		*	
Quahog Bay		*	
Long Reach		*	
Coombs Island area		*	
Cedar Ledges		*	
Drunkers Ledge			*
Whale Rock			*
Jaquish Island			*
Pinkham Island			*
Little Birch Island			*
Birch Island Ledge			*
Barnes Island			*
Whaleboat Island			*
Little Whaleboat Island			*
Birch Island			*
Harpswell Cove			*
Long Point Island			*
Bailey Island (West)			*
Ram Island			*
Black Snake Ledge			*
Round Rock			*
East Brown Cow			*
Flag Island			*
Long Ledge			*
Yellow Rock/Two Bush/Elm Island			*
Rogue Island			*
Ridley Cove			*
Quahog Sound			*
Hen Cove			*
Sheep Island			*
Long Island			*
Three Island area			*
Reed Cove			*

Harpwell (cont.)

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

Eagle Island	Little Mark Island
Haddock Rock	Jaquish Island
Turnip Island	Ram Island
Elm Ledge	Elm Island (West)
The Sisters (East)	Flag Island
Long Ledge (South)	Pinkham Island
Thrumcap Island	Horse Island
Upper Flag Island	Little Birch Island
Cedar Ledge (North)	Two Bush Island
Ragged Island	East Brown Cow
Long Ledge (North)	Cedar Ledges (South)
Little Whaleboat Island	Grassy Ledge
Pond Island	Duck Rock
Elm (East)	White Bull Island
Mark Island	Jenny Island

2) Wading Bird Rookeries:

Upper Goose Island
Eagle Island
Mark Island

3) Bald Eagle Nest Sites (Historic):

Eagle Island

4) Osprey Nest Sites:

Center Island	Williams Island (southeast of Snow Island)
Snow Island	Ben Island
Little Birch Island	Islands (2) east of Snow Island
White Bull	The Goslings (East and West)
Little Whaleboat Island	Upper Goose Island
Birch Island	Skolfield Cove
Doughty Point	Island south of Prince Point
Mark Island	Long Reach
Orrs Cove	Brickyard Cove
east of Orrs Cove	east of Tondreau's Point
Quahog Bay (East)	Dingley Island
west of Dingley Island	Long Island
Flag Island	northwest of Dingley Island

5) Shorebird Feeding and Roosting Areas:

Middle Bay Cove

Harpwell (cont.)

6) Seal Haul-Outs:

Little Whaleboat Island ledges
Birch Island area
Wilson Ledges
Dogs Head
Pond Island Ledges
Hen Cove
Ben Island area

Lower Goose Island area
Little Birch Island
Wilson Cove
Gun Point Cove
Ballastone Ledges
Cedar Ledges

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

None Observed

Town: Kittery

Fisheries Habitat (Inventory #)

Rating

1) Brooks and Streams:	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
Spinney Creek			*	
Wilson Creek			*	
Unnamed Brook (008040500)			*	
Fuller Brook			*	
Hill Creek			*	
Hutchins Brook			*	
Crocketts Brook			*	
Spruce Creek			*	
Libby Brook			*	
Piscataqua River				*
Johnson Brook				*
Cutts Ridge Brook		*		
2) Lakes and Ponds:				
Legion Pond		*		

Wildlife Habitat

1) Deer Wintering Areas:

Gerrish Island	*
Brave Boat Harbor Trib.	*
Lewis Road	*
Johnson Brook	*

2) Wetlands:

Behind Seapoint Beach	*		
Fort Foster Pond	*		
Fort Foster Marsh			*
Pocahontas Road Marsh	*		
Brave Boat Harbor Marsh	*		
Deerings Pond			*
N Kittery Pt. Marsh	*		
Cutts Pond		*	
Crocketts Brook-Marsh			*
1/2 mi. W of Bedell Crossing	*		
N of Forty-Acre Hill			*
E of Johnson Brook			*
Hill Creek Marsh			*
W-end of Spruce Creek		*	
Highland Cem. Marsh			*
Legion Pond		*	
Spinney Creek	*		
1/2 mi. SE Bartlett Hill			*
3/4 mi. N of Cutts Ridge			*

Kittery (cont.)

3) Marine Wildlife Habitats

Not Surveyed

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

Clark's Island
Duck Island
Smuttynose Island
Appledore Island
Cedar Island

2) Wading Bird Rookeries:

Appledore Island

3) Bald Eagle Nest Sites:

None Observed

4) Osprey Nest Sites:

None Observed

5) Shorebird Feeding and Roosting Areas:

Brave Boat Harbor
Crescent Beach
Seapoint Beach

6) Seal Haul-Outs (Incomplete Survey):

Ledges at mouth of Brave Boat Harbor
Ledges west of Horn Island
Duck Island and ledges

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

None Observed

Town: Old Orchard Beach

Fisheries Habitat (Inventory #)

Rating

1) Brooks and Streams:	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
Unnamed Brook (0330010000)		*		
Unnamed Brook (0330040000)		*		
Unnamed Brook (0330060000)		*		
Jones Creek				*
Goosefare Brook		*		
Mill Brook (0340020100)		*		
Unnamed Brook (034002010A)				*
Cascade Brook		*		
2) Lakes and Ponds:				
None Observed				

Wildlife Habitat

1) Deer Wintering Areas:

Mill Brook *

2) Wetlands:

W of W Grand Avenue *

Mill Brook/Jones Brook Marsh *

Mill Brook *

3) Marine Wildlife Habitats:

Classification

	<u>A</u>	<u>B</u>	<u>C</u>
Bluff/Stratton Islands (Incomplete Survey)	*		

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

Bluff Island

Stratton Island

2) Wading Bird Rookeries:

Stratton Island

3) Bald Eagle Nest Sites:

None Observed

Old Orchard Beach (cont.)

4) Osprey Nest Sites:

None Observed

5) Shorebird Feeding and Roosting Areas:

Old Orchard Beach
Goosefare Brook

6) Seal Haul-Outs (incomplete survey):

Bluff Island
Stratton Island

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

None Observed

Town: Phippsburg

Fisheries Habitat (Inventory #)

Rating

1) Brooks and Streams:	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
Unnamed Brook (0800000000)			*	
Unnamed Brook (0790000000)			*	
Unnamed Brook (0780000000)			*	
Unnamed Brook (0760010000)				*
Cutting Creek				*
Unnamed Brook (0740000000)			*	
Parkerhead Creek			*	
Meeting House Pond Outlet				*
Morse Road				*
Sprague Road				*
Unnamed Brook (0690000000)			*	
North Creek			*	
Pasture Brook			*	
Unnamed Brook (0730010000)			*	
Unnamed Brook (0770000000)			*	
Unnamed Brook (0720000000)			*	
Winnegance Creek				*
2) Lakes and Ponds:				
Big Pond		*		
Center Pond		*		
Silver Lake		*		
Spirit Pond				*
Wat-tah Lake		*		
Winnegance Pond	*			

Wildlife Habitat

1) Deer Wintering Areas:

Morse Mountain	*	
Meetinghouse Pond		*
Ashdale	*	
NW of Parker Head		*
Cape Small	*	

2) Wetlands:

Big Pond			*
1/2 mi. W of Sprague River			*
Sprague River	*		
Morse River		*	
Small Point Marsh-S	*		
Small Point Marsh-N			*
Tottman Cove Marsh			*
Silver Lake		*	
Spirit Pond		*	
Meetinghouse Pond			*
N of Atkins Bay		*	

Phippsburg (cont.)

2) Wetlands (cont.)	Rating			
	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
Wyman Bay Area	*			
S of Parker Head Swamp				*
Parker Head Swamp				*
Duley Pond				*
W of Duley Pond				*
E of Pasture Ridge				*
Mill Pond		*		
W of Mill Pond		*		
N of Mill Pond				*
3/4 mi. E of Burnt Ledge	*			
1/2 mi. N of Burnt Ledge				*
1/2 mi. N of Badge Hill				*
S of Phippsburg (town)			*	
Pasture Brook Marsh				*
Off of Stony Brook Road				*
Cutting Creek	*			
W of Cutting Creek				*
1/2 mi. N of Meadowbrook				*
3/4 mi. NE of Meadowbrook				*
Winnegance Creek	*			
E-Outlet Winnegance Creek		*		

3) Marine Wildlife Habitats:	Classification		
	<u>A</u>	<u>B</u>	<u>C</u>
Winnegance Bay	*		
Morse River	*		
Sprague River	*		
Seawall Beach	*		
Heron Island	*		
Fox Island	*		
Hunnewell Beach	*		
North Sugarloaf Island	*		
Atkins Bay	*		
Mill Pond	*		
Lee Island	*		
Winnegance Creek	*		
Seal Island	*		
Fuller Rock		*	
Bold Dick Rock		*	
Pond Island		*	
South Sugarloaf Island		*	
Goat Island		*	
Jamison Ledge			*
Bear Island			*
The Basin			*
Sebasco Harbor			*

Phippsburg (cont.)

Marine Wildlife Habitats (cont.):

Classification

	A	B	C
Small Point Harbor			*
Wood Island			*
Wallace Head/Head Beach			*
Cape Small			*
Wood Island			*
Wyman Bay			*
Pettis Rocks/Ram Island			*
Fiddler Reach			*

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

Fuller Rock	North Sugarloaf Island
Seal Island	South Sugarloaf Island
Heron Islands	Hen Island
Wood Island	Gooseberry Island
Pond Island	Small Point Beach
	Morse Hill Point

2) Wading Bird Rookeries:

None Observed

3) Bald Eagle Nest Sites:

None Observed

4) Osprey Nest Sites:

Wood Island
Bear Island

5) Shorebird Feeding and Roosting Areas:

Winnegance Creek	Drummore Bay
Mill Pond	Wyman Bay
Atkins Bay	Hunnewell Beach
Popham Beach	Cape Small Harbor
Morse River	Sprague River
Seawall Beach	Head Cove
Bald Head Cove	Small Point Beach
Winnegance Bay	

6) Seal Haul-Outs:

Bushy Island	Goat Island ledges
Seal Island	Pettis Rocks
Heron Islands	

Phippsburg (cont.)

7) Least Tern and Piping Plover Nest Sites:

Sprague River/Seawall Beach (least terns, piping plovers)
Popham Beach (least terns, piping plovers)
Hunnewell Beach (least terns)

8) Other Special Wildlife Habitats:

None Observed

Town: Portland

Fisheries Habitat (Inventory #)

Rating

	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
1) Brooks and Streams:				
Unnamed Brook (0430040000)		*		
Fall Brook			*	
Capisic Pond Inlet			*	
Clark Brook			*	
Presumpscot River				*
Stroudwater River	*			
Long Creek			*	
2) Lakes and Ponds:				
None Observed				

Wildlife Habitat

1) Deer Wintering Areas:				
Stroudwater	*			
2) Wetlands:				
Capisic Pond			*	
Fore River (West end)	*			
Deering wetland				*
Riverton Bridge Wetland				*

3) Marine Wildlife Habitats:

Classification

	<u>A</u>	<u>B</u>	<u>C</u>
Back Cove	*		
Presumpscot River	*		
Ram Island	*		
Little Chebeague Island/	*		
Chandler Cove	*		
Jewell Island (East)	*		
Green Island Reef	*		
Outer Green Island	*		
Stroudwater River		*	
Diamond Island Ledge		*	
Peaks Island (East)		*	
Cliff Island (North)		*	
Inner Green Island		*	
Mackworth Island			*
East Deering			*
Great Diamond Island			*
Pomroy Rock			*
Diamond Pass			*
House Island			*

Portland (cont.)

Marine Wildlife Habitats (cont.):	Classification		
	A	B	C
Cushing Island (West)			*
Cushing Island (East)			*
College Island/Overset Island			*
Vail Island/Obeds Rock			*
Stepping Stones			*
Cliff Island (South)			*
Jewell Island (West)			*

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

House Island	Crow Island
Crow Island	Ram Island
Pumpkin Nob	Vaill Island
Stepping Stones (North)	Inner Green Island
Outer Green Island	Junk of Pork

2) Wading Bird Rookeries:

Ram Island

3) Bald Eagle Nest Sites:

None Observed

4) Osprey Nest Sites:

None Observed

5) Shorebird Feeding and Roosting Areas:

Presumpscot River
Back Cove
Fore River

6) Seal Haul-Outs:

Halfway Rock
Little Chebeague Island area
Inner Green Island

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

None Observed

Town: Saco

Fisheries Habitat (Inventory #)

Rating

1) Brooks and Streams:	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
Unnamed Brook (033005000A)		*		
Branch Brook			*	
Goosefare Brook		*		
Stackpole Creek		*		
Cole Brook			*	
Sandy Brook			*	
Deep Brook		*		
Foxwell Brook			*	
Stuart Brook		*		
Cascade Falls Brook		*		
Grant Brook			*	
Boynton Brook		*		
Nonesuch Brook		*		
Skilly Brook		*		
Ricker Brook		*		
Innis Brook			*	
Unnamed Brook (0330070000)			*	
Unnamed Brook (0320080000)				*
Mill Brook (0340020100)		*		
Nonesuch River	*			
Merrill Brook			*	
Unnamed Brook (032007000A)		*		
Harmon Brook				*
Dennet Brook				*
Saco River				*

2) Lakes and Ponds:

None Observed

Wildlife Habitat

1) Deer Wintering Areas:

Bayview	*			
Cascade Brook	*			
The Heath	*			
Boynton Brook		*		
Grant Road	*			
Route 112	*			
Saco/Baxton Line	*			
Simpson Road			*	

2) Wetlands:

Short Pond			*	
Long Pond		*		
N of Long Pond			*	

Saco (cont.)

	Rating			
	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
2) Wetlands (cont.):				
S of Short Pond			*	
E of Chase Point		*		
Goosefare Brook Marsh	*			
N of Goosefare Brook			*	
Saco River at Grays Pt.	*			
S of Grays Point	*			
Innis Brook/Goosefare Brook			*	
E of Goosefare Brook				*
Saco River by RR tracks				*
Cole Brook			*	
N of Cole Brook		*		
N of Route 5				*
W of Dennett Brook			*	
S of Slater Hill			*	
3/4 mi. N of Cascade Brook				*
The Heath				*
Ricker Brook headwaters			*	
N of Boothbay Park				*
Adj. to Ash Swamp Road				*
N of Heath Road and Watson Mill Road Junction				*
Skilly Brook				*
N of Heath Church				*
W of Berry Hill				*
SW of Berry Hill				*
SW of Route 112/117 Jct.				*

3) Marine Wildlife Habitats:

Not Surveyed

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

Eagle Island
Ram Island

2) Wading Bird Rookeries:

None Observed

3) Bald Eagle Nest Sites:

None Observed

Saco (cont.)

4) Osprey Nest Sites:

None Observed

5) Shorebird Feeding and Roosting Areas:

Camp Ellis
Ferry Beach
Goosefare Brook

Saco River (east of Chast Point)
Saco River (Edgecomb Point)

6) Seal Haul-Outs:

Ram Island
Eagle Island

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

None Observed

Town: Scarborough

Fisheries Habitat (Inventory #)

Rating

1) Brooks and Streams:	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
Libby River			*	
Nonesuch River	*			
Fogg Brook		*		
Silver Brook		*		
Red Brook		*		
Beaver Brook		*		
Finnard Brook		*		
Phillips Brook			*	
Dunston River			*	
Mill Brook		*		
Bond Brook		*		
Unnamed Brook (0340030100)			*	
Merrill Brook			*	
Carter brook		*		
Unnamed Brook (0340030400)			*	
Unnamed Brook (0340030300)			*	
Beech Ridge Brook			*	
Stroudwater River (S Branch)			*	
Stuart Brook		*		
Jones Creek				*
Unnamed Brook (0340040100)				*
Cascade Falls Brook		*		
Spurwink River				*

2) Lakes and Ponds:

Massacre Pond	*
---------------	---

Wildlife Habitat

1) Deer Wintering Areas:

Old Blue Point Road			*	
NW of Scottow Bog		*		
Finnerd Brook	*			
N of Ash Swamp Road		*		
Nonesuch River				*
N of W Beech Ridge Road	*			
S of W Beech Ridge Road	*			
Fogg Brook	*			

2) Wetlands:

1/2 mi. N of Fogg Hill				*
Silver Brook/South Brookry				*
Nonesuch River - N and S of W Beech Ridge Road				*

Scarborough (cont.)

2) Wetlands (cont.):	Rating			
	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
Mitchell Hill Marsh				*
Mitchell Hill Pond		*		
1/2 mi. N of Holmes Road, by Saco boundary line				*
S of Ash Swamp Road				*
Dresser Road Pond		*		
N of Beech Ridge Speedway				*
SE of Beech Ridge Speedway			*	
Red Brook Marsh				*
Nonesuch River E of 95-1				*
Nonesuch River E of 95-2		*		
W of Scarborough Downs				*
W of Payne Road			*	
Finnerd Brook				*
Dunstan River				*
Brook S of Old Blue Point Road/Saco	*			
S of Old Blue Point Road		*		
Scottow Bog				*
NW of Oak Hill				*
Nonesuch River NW of Rt. 1				*
Nonesuch River SE of Rt. 1				*
Scarborough Marsh	*			
NW of Ross Road				*
SE of Ross Road				*
Little River Marsh/ Junes Creek	*			
S of Black Point Road				*
SE of Fogg Road				*
NE of Pleasant Hill Road				*
3/4 mi. NE of Pleasant Hill Road				*
1/2 mi. N of Spurwink Road				*
Spurwink River Marsh	*			
Massacre Pond	*			

3) Marine Wildlife Habitats:	Classification		
	<u>A</u>	<u>B</u>	<u>C</u>
Scarborough Marsh	*		
Prout's Neck	*		
Higgins Beach	*		
Shooting Rock		*	
Spurwink River		*	

Scarborough (cont.)

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

None Observed

2) Wading Bird Rookeries:

None Observed

3) Bald Eagle Nest Sites:

None Observed

4) Osprey Nest Sites:

None Observed

5) Shorebird Feeding and Roosting Areas:

Scarborough Marsh
Dunstan River
Pine Point Beach
Western Beach
Higgins Beach
Ferry Beach

Scarborough River
Grand Beach
Libby River
Checkly Point
Spurwink River

6) Seal Haul-Outs:

Shooting Rock

7) Least Tern and Piping Plover Nest Sites:

Pine Point (least terns, piping plovers)
Ferry Beach (least terns)
Western Beach (least terns, piping plovers)
Scarborough Beach (piping plovers)

8) Other Special Wildlife Habitats:

None Observed

Town: South Portland

Fisheries Habitat (Inventory #)

Rating

1) Brooks and Streams:	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
Trout Brook			*	
Kimball Brook			*	
Barberry Creek			*	
Long Creek			*	
Unnamed Brook (0340030100)			*	
Unnamed Brook (0350030000)			*	
Red Brook		*		
Anthoine Brook				*
2) Lakes and Ponds:				
Clarks Pond			*	

Wildlife Habitat

1) Deer Wintering Areas:

None Observed

2) Wetlands:

West of Rigby RR yards			*
E of Rigby RR yards		*	
1/4 mi. S of S. Portland		*	
Gardens		*	
W of Running Hill			*
Barberry Creek			*
Kimball Brook N		*	
Kimball Brook S		*	

3) Marine Wildlife Habitats:

Classification

	<u>A</u>	<u>B</u>	<u>C</u>
Fore River Cove	*		
Long Cove	*		
South Portland Cove		*	

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

None Observed

2) Wading Bird Rookeries:

None Observed

South Portland (cont.)

3) Bald Eagle Nest Sites:

None Observed

4) Osprey Nest Sites:

None Observed

5) Shorebird Feeding and Roosting Areas:

Fore River

6) Seal Haul-Outs:

None Observed

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

None Observed

Town: West Bath

Fisheries Habitat (Inventory #)

Rating

	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
1) Brooks and Streams:				
Unnamed Brook (0620000000)			*	
Unnamed Brook (0630000000)			*	
Dam Cove Creek		*		
Birchwood Pond Outlet			*	
Unnamed Brook (0830010000)			*	
Houghton Pond Outlet				*
Whiskeag Creek		*		
2) Lakes and Ponds:				
Houghton Pond		*		
Lilly Pond		*		

Wildlife Habitat

1) Deer Wintering Areas:

Birch Point		*
N of West Bath Church	*	
NE of West Bath Church	*	

2) Wetlands:

1 mi. NE of West Bath Church		*
1 1/4 mi. NE of West Bath Church		*
1 mi. NE of Great Hill		*
1 mi. E of Lowell School		*

3) Marine Wildlife Habitats:

Classification

	<u>A</u>	<u>B</u>	<u>C</u>
Winnegance Bay	*		
Middle Ground/Thomas Bay		*	
Mill Cove		*	
Back Cove			*
Upper New Meadows			*

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

None Observed

2) Wading Bird Rookeries:

None Observed

West Bath (cont.)

3) Bald Eagle Nest Sites:

None Observed

4) Osprey Nest Sites:

Williams Island
Back Cove
Rich Hill
Bragdon Rock

5) Shorebird Feeding and Roosting Areas:

Winnegance Creek
Winnegance Bay

6) Seal Haul-Outs:

None Observed

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

None Observed

Town: Yarmouth

Fisheries Habitat (Inventory #)

Rating

1) Brooks and Streams:	<u>High</u>	<u>Moderate</u>	<u>Low</u>	<u>Indeterminate</u>
Pratts Brook			*	
Cousins River		*		
Royal River	*			
Unnamed Brook (0460010000)			*	
Unnamed Brook (0460020000)		*		
Unnamed Brook (0460030000)				*
Unnamed Brook (0460040000)			*	
Piscataqua River (east)		*		
Unnamed Brook (0450000000)			*	
2) Lakes and Ponds:				
None Observed				

Wildlife Habitat

1) Deer Wintering Areas:

None Observed

2) Wetlands:

N Royal River
Pratts Brook

*

*

3) Marine Wildlife Habitats:

Classification

	<u>A</u>	<u>B</u>	<u>C</u>
Broad Cove	*		
Division Point	*		
Sandy Point Ledges		*	
Cousins Island (North)		*	
Lanes Island		*	
Cousins River/Royal River		*	
Cousins Island (South)			*
Littlejohn Island			*
Cousins Island (Mainland)			*
Moshier Island			*

Special Wildlife Features (No ratings or classification performed)

1) Colonial Nesting Seabird Islands:

The Nubbin

Yarmouth (cont.)

2) Wading Bird Rookeries:

None Observed

3) Bald Eagle Nest Sites:

None Observed

4) Osprey Nest Sites:

None Observed

5) Shorebird Feeding and Roosting Areas:

Royal River
Cousins River

6) Seal Haul-Outs:

Sandy Point Ledges
Crab Ledge

7) Least Tern and Piping Plover Nest Sites:

None Observed

8) Other Special Wildlife Habitats:

None Observed

Appendix 3. Importance of Riparian Habitats to Fish, Birds, and Mammals

FISH: Deforestation of the riparian zone changes the biotic and abiotic characteristics of a river community. The abiotic effects include increases in temperature, flow rate, and sedimentation (Moring 1975, Corbett et al. 1978, Garmon 1984). The mechanisms for these changes are well understood. Canopy removal in the riparian zone increases the incident radiation to the ground, causing temperatures to rise significantly in streams (Garmon 1984). Higher flow rates are caused by sudden increases in runoff during rainstorms, and by reduced evapotranspiration of groundwater reserves (Moring 1982, Garman 1984). After deforestation, water that was previously absorbed by the riparian vegetation is now free to flow directly into the river, thereby increasing flow rates. Sedimentation also occurs from runoff during and after logging operation where riparian bufferstrips are not maintained (Breschta 1978, Moring 1982, Garman 1984).

These abiotic alterations are responsible for dramatic changes in stream biota. Lower invertebrate diversity is regularly associated with logging that occurs without maintaining bufferstrips (Hall and Lantz 1969, Moring and Lantz 1975, Garman 1984). Furthermore Erman and Mahoney (1983) showed that the invertebrate community did not recover completely five years after the riparian area was logged. In Maine, brook trout were extirpated from a stream where logging occurred without bufferstrips (Garman 1984). Studies have indicated that riparian vegetation is the single most important factor influencing the carrying capacity of salmonids in small streams (Wesche et al. 1987). Platts (1983) and Moring et al. (1985) reviewed the functions of riparian vegetation along streams from the perspective of fisheries habitat. The five functions identified include 1) regulation of stream temperature, 2) stabilization of stream banks, 3) input and regulation of nutrients into the system, 4) direct input of invertebrates as fish food, and 5) fish cover. Deforestation within the riparian buffer interrupts these functions and significantly degrades the water quality. This, in turn, negatively impacts invertebrates, fish, and wildlife within the aquatic habitat.

These studies indicate that riparian areas need to be protected if we are to maintain fisheries and water quality. Whether the riparian zone is deforested by logging or development, the deleterious effects are the same. What needs to be decided is how much protection is enough. The Department of Environmental Protection (DEP) recognized the need to protect streams. Subsequently, Policy #13 was adopted by the Board of Environmental Protection (BEP) in 1983, which requires review of stream alterations under the Site Location of Development Law (38 MRSA, Chapter 375).

Important BEP policy statements from Policy #13 are summarized in the next two paragraphs.

"Stream alteration inherently degrades to some degree the natural values of streams and their associated shoreland areas. When an alteration to a stream and its shoreline is proposed, the natural resource values of that stream environs are in balance. When development encroaches upon a stream, it does so directly at the expense of that stream's natural values. The BEP recognizes the natural values of stream environs in Maine including 1) their water quality (chemical and physical characteristics); 2) their importance as critical habitat for fish and aquatic life; 3) their value as wildlife habitat; 4) their scenic character and their role as aesthetic features of the Maine landscape; 5) their flood water storage capacity; and 6) their use for outdoor recreation."

"The BEP operates under the rebuttable presumption that the diversion, channelization, and/or piping of perennial streams will have an adverse effect on the natural environment. More specifically, it is the presumption of the BEP that such alterations will result in 1) adverse effects on surface water quality from non-point pollution sources; 2) the long-term loss of aquatic and fishery habitat; 3) the loss of wildlife habitat; 4) the loss of recreation opportunities; 5) the permanent loss of an aesthetic landscape feature; 6) the encouragement and worsening of downstream flooding; and 7) the increasingly important and adverse cumulative environmental effects."

Riparian buffers around lakes and ponds provide the same functions for protecting fish and invertebrates as riparian buffers around streams. Smaller and shallower lakes and ponds with low flushing rates are more susceptible to pollution and eutrophication than larger deep-water lakes (Rosenfeld 1986). Degradation of water quality can occur rapidly in these systems if they are overloaded with nutrients or pollutants, particularly phosphorus (Dennis 1986). Downstream lakes are susceptible to nutrient overloads, resulting in eutrophication, when excess dissolved solids and particulate matter are washed downstream from cleared land (Pierce et al. 1970, Davies and Sowles 1984). Riparian buffers can be significant natural filtration mechanisms. Degradation of water quality in large lakes, due to the loss of riparian vegetation, is usually less dramatic and occurs over longer periods of time. The capacity of any given pond or lake to sustain shoreline development without deleterious effects varies greatly depending on such factors as the size, depth, and turnover rate, as well as previously mentioned riparian zone characteristics.

The size of a riparian buffer needed to adequately protect water quality is determined by:

- soil characteristics including drainage, depth to bedrock, rooting depth, permeability, surface stoniness and rockiness, and soil chemical and mineral composition (Ferberda et al. 1975, Davies 1986, Olsen and Adams 1984, USDA 1974 and 1982).
- pollutant characteristic including reactivity with soil and water, breakdown rates and by-products, toxicity to plants and animals, and the amount, concentration and duration of pollutant release (Olsen and Adams 1984, Davies 1986).
- desired water quality standards.
- type of water body.

All of these factors interact in a complex manner that necessitates a thorough understanding of each component and their interactions with one another before sound recommendations can be made. Riparian buffer and habitat site characteristics often change considerably within the same water body. Ideally management recommendations should be targeted at adequately maintaining water quality throughout entire streams, lakes, ponds, or watersheds.

A number of authors have suggested varying riparian buffer widths necessary to maintain water quality (SCS 1985, LURC 1986, Erman and Mahoney 1982, Steinblums et al. 1984, Davies and Sowles 1984, Brinson et al. 1981). One theme that is repeatedly stated throughout all of these references is that site characteristics vary considerably throughout individual water courses, let alone streams or regions. Therefore it is difficult to give minimal riparian buffer widths that will protect all conditions. Table 1 contains management recommendations that reflect the need to protect the majority of sites.

Table 1. Suggested riparian buffer widths necessary to maintain water quality.

Riparian Buffer Width	Source
30+m	Erman and Mahoney 1983
43+m	Steinblums et al. 1984
38+m	LURC 1986
30+m	Newbold et al. 1980
38+m	USDA, SCS 1985
30+m	DEP 1983

BIRDS: Riparian habitat supports a greater diversity of birds in greater densities than adjacent areas (Odum 1979, Bull 1978). In the United States over 250 species of birds depend on riparian habitat for cover or feeding during some part of the year (Brinson et al. 1981). Brinson et al. (1981), summarizing many authors, reported that individual riparian woodlands usually have from 10 to 50 breeding bird species. Lortie and Pelletier (1987) found 38 breeding bird species in coastal riparian habitat in southern Maine. Birds also use riparian habitat as wintering and migrational staging areas.

The size and vegetational characteristics of riparian zones determine the type and amount of feeding, nesting, and roosting habitat available to birds. Larger areas that contain a diversity of plant types and size classes usually contain a wider array of avian species. Narrow riparian bufferstrips will provide habitat for edge species, which tend to be common and widely distributed. In southern Maine, song sparrows, common yellowthroats, yellow warblers, and eastern kingbirds were found nesting in riparian bufferstrips less than 10 m wide (Lortie and Pelletier 1987). However, all of these species are common or abundant nesters in the area. Cooper's hawks and sharp-shinned hawks nesting in the same general areas were found only in riparian habitat 100 m or more wide (Lortie, pers. observ.).

Stauffer and Best (1980) state that a 200 m wide vegetative strip is apparently able to accommodate breeding territories of most songbirds. Maintaining riparian habitat alone will not provide adequate habitat for species with large territories. Adjacent undeveloped forests are essential and add significantly to the value of riparian habitat areas.

Studies by Johnson (1986) and Clark et al. (1984) indicate many species of birds breeding within riparian habitats are not tolerant of deforestation. In Maine, Johnson (1986) concluded that a bufferstrip of 75 m is needed to maintain habitats of most breeding birds in riparian habitat around ponds. Within that 75 m, he suggested leaving the first 25 m completely undisturbed with no cutting or development allowed. Within the remaining 50 m, cutting of 30-50% of the canopy cover could be allowed, but no development should occur. Such management recommendations were aimed at maintaining habitat for songbirds. These recommendations are unsuitable for large raptors that require extensive tracts of riparian habitat for breeding. Stadler (1984) stated that a bufferstrip of 100 m was important for maintaining habitat for breeding birds in Maine.

In addition to providing nesting and feeding habitat for birds, riparian bufferstrips also protect water quality, ensuring viable habitat for invertebrates and fish that

support shorebirds, wading birds, and other piscivorous animals. Migratory shorebirds are an excellent example of the importance of maintaining water quality. Thirty-one species that breed in North America, annually migrate more than 12,000 miles to nest in the Arctic and winter in South America (Meyers et al. 1987). During migration these birds only stop at a few key staging areas where they rest and rebuild fat reserves essential for continuing their migration (Mead 1983, Hayman et al. 1986, Meyers et al. 1987). Food and habitat availability studies indicate that these birds have no other alternative sites (Senner and Howe 1984). Therefore these areas are irreplaceable natural resources and destruction of the food resource, resulting from water quality degradation, would cause dramatic population declines (Meyers et al. 1987).

The sensitivity of aquatic organisms to the toxicity of metals and other pollutants is highly varied and depends on the species, life stage, substrate and pollutant characteristics (Davies 1986, Gerber 1987, Olsen and Adams 1984).

Management recommendations should be targeted at maintaining high water quality using worst case scenarios rather than best case scenarios. This will ensure that the intricate relationships between invertebrates, fishes, birds, and other animals dependent on this system will persist. Table 2 contains some recommended riparian habitat widths needed to maintain habitats of some breeding bird species.

Table 2. Suggested riparian habitat widths necessary to maintain some breeding bird populations.

Riparian Habitat Width	Source
100-200 m	Stadler 1984
75 m	Small and Johnson 1986
200 m	Stauffer and Best 1980
100+ m	Gaines 1974

MAMMALS: Riparian habitat is also valuable to deer and other mammals. In Maine a survey of 350 deer wintering areas found that 85 percent of these areas occurred in riparian conifer stands (Banasiak 1964). The lowland topography and dense vegetation of these areas shelter deer from low temperatures and high winds. In addition, snow on the adjacent waterway is usually shallow or densely packed

offering better travel opportunities for deer or other mammals (Thomas et al. 1979). Deer show high fidelity to specific winter and summer ranges (Tierson et al. 1985), and are poor colonizers of new or recently vacated habitat (Lavigne 1986). Such behavior has important implications for managing and protecting travel corridors for deer. Even if essential winter or summer ranges are available, deer may abandon these areas if travel opportunities are cut off.

Telemetry studies in Maine indicate furbearers select riparian habitats over adjacent habitats (DiBello 1982). Eighty-five percent of the furbearers located were found within 100 m of water. DiBello (1982) included locations of coyote, bobcat, red fox, fisher, and marten. These species use the riparian zone as a route for travelling within their extensive home ranges. They also feed in riparian habitat, which usually contains higher densities of food items than less diverse adjacent habitats. Brinson et al. (1981) reported many vertebrates, especially riparian mammals, reptiles, and amphibians, concentrate their activities well within 60 m of water.

Water oriented mammals, particularly furbearers and certain small mammals, are almost entirely restricted to riparian habitats of streams, rivers, and lakes (Brinson et al. 1981). Many upland mammal species can also be found in riparian habitat, reflecting the high productivity of these areas. In southern Maine seven species of small mammals and seven species of large mammals frequent riparian habitat surrounding salt marshes (Lortie and Pelletier 1987). Because riparian ecosystems contain suitable habitat for upland, wetland, and riparian species, the majority of species in any given region can be found there. Alteration of riparian ecosystems can have significant negative impacts on small and large mammal species richness and abundance (Barclay 1980).

Table 3. Suggested riparian habitat widths necessary to maintain some mammal species populations.

Riparian Habitat Width	Source
100 m (large mammals)	DiBello 1982
67 m (small mammals)	Cross 1985
73-93 m (small mammals)	Dickson and Huntley 1985

Appendix 4. Detailed Explanation of Fisheries Methodology

- A. Stream Habitats: Streams within the 17 town study area were identified using the stream inventory file developed by MDIFW. This file was assembled in 1965 from a compilation of streams delineated on USGS 15 minute quadrangle maps. Very little inventory data relative to either habitat or fishery types were available for the streams in the study area. Thus it was necessary to under take a comprehensive sampling effort during the summer months of 1986 and 1987 to collect the necessary inventory data and to assess and rate these stream habitats. Data collection included a determination of species presence, basic water quality and habitat descriptions. In addition, data on drainage areas, stream lengths, widths and area, general surficial geology, and the presence or absence of known aquifer areas were collected from field surveys, maps and other available sources.

Species presence was determined utilizing back-pack electro-shockers. Each stream was sampled in at least one location near the drainage mid-point if practically possible. Excessive stream area, water depth, or inaccessibility, precluded such sampling on several streams. The amount of stream area sampled also varied and was dependent on sampling conditions. Data on stream widths, water depth and substrate type were collected at each sample site either during the fish survey or water quality survey.

Water quality data were collected on each stream at or near the fish sampling location. Data were collected on dissolved oxygen, pH, temperature, alkalinity, conductivity and water color. Meters were used to measure all parameters except alkalinity, which was measured using the standard titration method. Water color was subjectively determined and turbidity noted if apparent. All water quality measurements were collected independently of the fish sampling and not collected during or immediately following storm events. All water quality data were collected during periods when water temperature from thermal input would normally be the warmest (ie. June 20 to August 15) and base flows were at or near the lowest for the year. A slightly more ideal sampling period to detect warmest stream temperatures and lowest base flows would have been from mid-July through mid-August. However, time constraints on the project precluded such

sampling. The objective of the water quality sampling was to measure conditions during a period that would have been most limiting on the fisheries. The sampling scheme used for the study did not fulfill that objective in every case, however, it is felt that sampling was adequate to allow an evaluation and rating of the streams in the study area.

- B. Great Ponds and Lakes: Lakes and ponds within the 17 town study area were selected using the MIDAS lake inventory file developed by the MDIFW. Only "great ponds" were included in this study. The State defines a great pond as any natural water body 10 acres or larger or any impoundment greater than 30 acres if bordered by more than one property owner. Most of the larger lakes and ponds have been previously inventoried by MDIFW, however, several smaller water bodies had not been previously studied. MDIFW staff obtained the necessary data from these lakes so that all of the "great ponds" within the study area could be evaluated and included in this report.

Data on physical morphometry, water quality, and fisheries were collected from each lake. Species presence was determined using gillnets, seines and minnow traps.

Water quality data was collected on similar parameters and with similar procedures used for stream habitats. Data were collected throughout the water column on each lake in order to construct profiles for each of the parameters tested. Morphometry data were collected using the transect method and depths recorded using electronic echo sounding equipment.

All data collected were used to evaluate the various lakes and streams in the study area and to determine the relative value of each respective habitat.

- C. Ranking: A systematic method was developed to generate raw scores to rank lake and stream habitats as being of high, moderate, or low resource value. Stream habitats are divided into two basic groups based on types of fisheries present. The first group was those streams containing principal fisheries and the second group those streams containing non-principal fisheries. Principal fisheries are defined as those species or fisheries sought after for

recreational purposes and/or those regulated by MDIFW. Principal fisheries were further divided into salmonid and non-salmonid groupings. Salmonid type fisheries included brook trout, brown trout, salmon, etc., and non-salmonids included largemouth and smallmouth bass, chain pickerel, white perch, black crappie, etc. All other species such as minnows, suckers, eels, etc. were considered non-principal fisheries. Scientific names of all species found in the study area are included in Appendix I.

All principal fisheries habitats were evaluated according to habitat suitability, species sensitivity, species value, and habitat area. Habitat suitability was determined utilizing field data collected on physical features, water quality, and temperature. Habitat suitability index curves were selected from the U.S. Department of the Interior, Fish and Wildlife Service habitat suitability index models (Edwards et al. 1982, Edwards et al. 1983, Raleigh 1982, Raleigh et al. 1984, Stuber et al. 1982) to represent salmonid and non-salmonid fisheries. The variables selected included depth, substrate type, oxygen levels, pH, and temperature. Each variable was evaluated to determine whether or not the habitat was highly suitable, moderately suitable, or unsuitable for the species being evaluated. The suitability index for highly suitable habitat had to be greater than 0.7 and such habitat received a value score of 3. The suitability index for moderately suitable habitat had to be greater than 0.3 but less than 0.7. Moderate habitat received a score of 2. A suitability index of less than 0.3 was interpreted as being marginal or unsuitable habitat and received a value score of 1.

Species sensitivity was also evaluated utilizing the suitability index curves. Those species with narrow ecological tolerances were considered more sensitive than those species with broader ecological tolerances to habitat features. Each habitat area was subjectively evaluated on the sensitivity of the species present to changes in physical features, water quality or temperature. Highly sensitive fisheries were assigned a value score of 3. Moderately sensitive fisheries were assigned a value score of 2 and fisheries not being affected by changes in physical features were assigned a value score of 1. Species value was also evaluated assessing relative abundance within the study area, rarity of the species

within the study area and the degree of natural reproduction. Value was also assessed evaluating fishing quality, relative utilization and aesthetics associated with the resource. A value score of 3, 2, or 1 was assigned to high, moderate and low values, respectively.

Habitat area is also an important criteria and contributed to the total score. The units used for measuring habitat area were the standard 900 square foot areas used in fisheries work by MDIFW. Each 900 square foot area represents one unit of habitat. The number of units was determined from the total area of stream habitat present in the main stem of each stream sampled. The units were assigned a value score of 1, 2, or 3 based on the categories of 0.1 to 250 units (0.01 to 5 acres), 251 to 500 units (5 to 10 acres), and greater than 500 units (10 acres), respectively.

Non-principal fisheries were evaluated according to species abundance, species rarity, and species economic importance. Similar value scores of 3, 2 and 1 were assigned to high, moderate, and low ratings, respectively for each criteria. The formula to generate a total score was also weighted for habitat area, utilizing the same value scores and unit categories as noted for the principal fisheries.

Total scores for each stream were calculated by combining principal and non-principal fisheries habitats. Scores were arranged in numeric sequence to determine each streams rank. Natural data gaps or groupings were identified from the list and high value, moderate value, and low value streams were determined from these data groups. It was decided from the data that total scores less than 25 would be assigned low value (F1), 26 to 74 moderate value (F2), and scores 75 or greater high value resources (F3). The process also allowed for an over-riding factor if the MDIFW staff was aware of additional data that would influence the value rating. Over-riding was applied to four streams in the study area. Intermittent streams and all stream habitat not sampled because of inaccessibility, etc., were given an indeterminate (F5) rating. Streams found to be strictly tidal (tidal creeks) were not included because the Department of Marine Resources has jurisdiction over these fisheries. Rivers with an average width of 50 feet or more were also excluded from the survey and ranking process. These areas were excluded because

criteria used to evaluate large rivers is substantially different from the methods used in this project. The methodology employed in this study was designed to collect and evaluate minor drainage habitats (i.e., drainages less than 25 square miles). Larger systems would require more intensive surveys, such as "representative reach" surveys or other intensive methodologies such as those employed when surveying major drainage systems. Larger streams and rivers excluded were the Piscataqua and Salmon Falls River in Kittery, and the Saco, Presumpscot and Androscoggin Rivers. These rivers are extremely valuable resources and exclusion from this project by no means precludes their importance. The management recommendations for high value fisheries should be implemented on these rivers as a minimum protectionary measure.

All lakes in the 17 town study area were evaluated utilizing the fisheries criteria developed by the Land Use Regulation Commission for the "Maine Wildland Lakes Assessment" (LURC 1986). Each lake was rated on value assessments for species habitat, public use, and economic importance. Species were evaluated relative to abundance, diversity, rarity, and reproduction. Habitat was evaluated relative to water quality and physical features. Public use was evaluated relative to fishing quality, fishing pressure, and aesthetic experiences. Values scores of 3, 2, or 1 were assigned to high, moderate, or low, respectively, for each category evaluated by MDIFW personnel. The cumulative score was determined by summing value scores assigned within each category for each lake. Each category was given equal weight. Total scores were arranged in numeric sequence from high to low and natural data groupings determined. Resource values of high, medium, or low were delineated using natural data gaps between scores. Total scores greater than 20 were rated high. Total scores between 15 and 20 were assigned a moderate rating, and scores of less than 15 were rated low.

- D. Results and Discussion, Stream Habitat: A total of 175 stream habitats were evaluated within the 17 town study area. Eight were rated as high value resource areas, 47 were rated moderate, and 94 were of low value to fisheries. Eight waters were tidal and therefore unrated. Twenty-six streams were determined to be intermittent or inaccessible for sampling and thus not rated. Appendix 2 summarizes the ratings for streams sampled within each town.

Figures 1 through 13 summarize the various data collected from the streams sampled. The typical stream in the study area was six to seven feet wide with a main stem length of approximately 2.5 miles. Most of the streams sampled were either first or second order streams.

All the streams in the study area are located in the Seaboard Lowland physiographic region. This region was primarily influenced by the late glacial marine submergence as seen from the predominance of fine glacial marine deposits found in most of the streams. The presence of sand and gravel aquifers was very limited on most of the streams sampled. Nine percent of the streams sampled had temperatures less than 60 degrees F (15 degrees C), with 33 percent considered too warm to support any salmonid species. According to criteria set by the EPA, thirty five percent of the streams in the study area were considered to have oxygen levels low enough to impair growth and survival of salmonid fisheries. Fifteen percent of the streams also had oxygen levels low enough to impair growth and survival of non-salmonid species.

The mean pH value for all waters sampled was 6.7. The range in pH observed in the study area was 4.8 to 8.0. The mean alkalinity for all waters in the study was 27 ppm (parts per million) calcium carbonate with a range from 2 to 107. In general, most waters in the area are considered soft water streams.

Fifteen percent of all streams sampled were found to have no fish. Eight percent contained only salmonid species, 54 percent had only non-salmonids including non-principal species, and 24 percent contained a combination of both salmonid and non-salmonid species. Only 7 percent of all the streams in the study area are stocked with hatchery reared fish by the Maine Department of Inland Fisheries and Wildlife. All remaining waters are considered to have self-sustaining and self-reproducing populations.

- E. Results and Discussions, Lakes: There were 17 lakes evaluated in the study area. They ranged in size from 11 to 634 acres. Only lakes 10 acres or more were considered. Highland Lake is the only water body of those surveyed containing any salmonid species. This lake is actively managed by the MDIFW. Forest Lake was the only other lake showing thermal stratification and had sufficient

FIG. 1. Size of Drainage Area in Square Miles of Streams surveyed in Southern Coastal Maine.

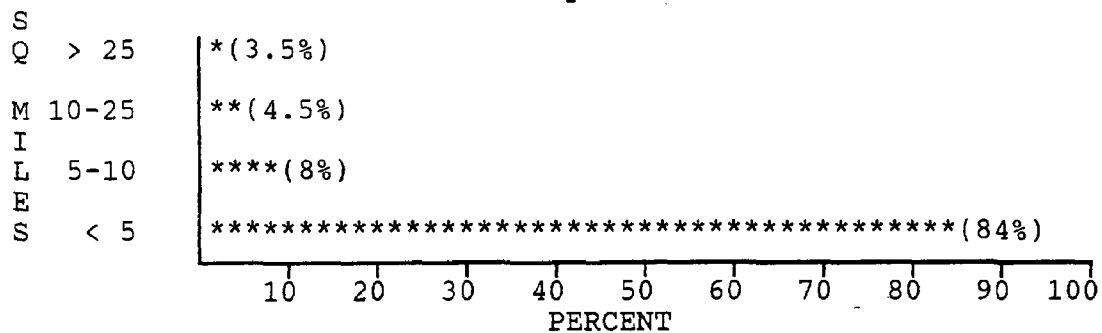


FIG. 2. Stream Order of Streams surveyed in Southern Coastal Maine.

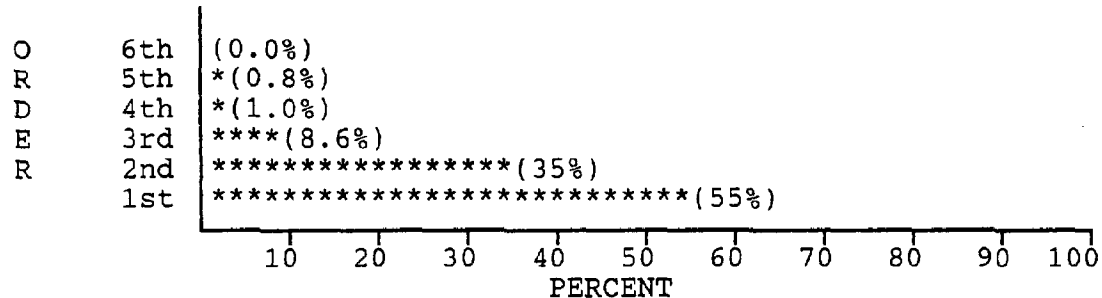


FIG. 3. Main stem Length in Miles of Streams surveyed in Southern Coastal Maine.

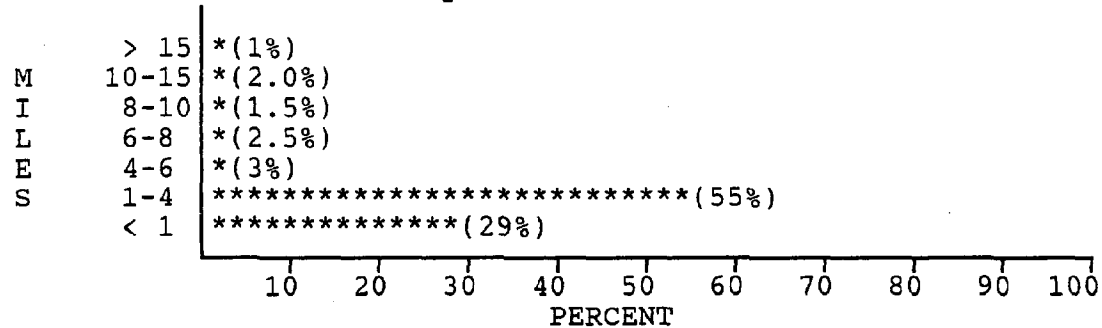


FIG. 4. Average Width in Feet of Streams surveyed in Southern Coastal Maine.

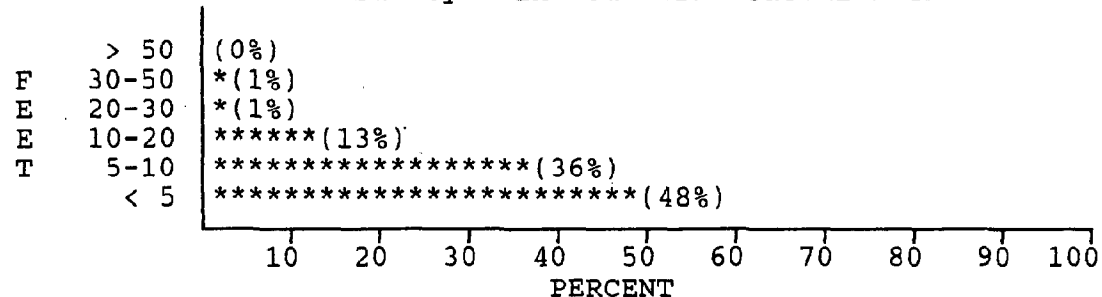


FIG. 5. Percentage of Main stem located in Sand and Gravel Aquifers for Streams surveyed in Southern Coastal Maine.

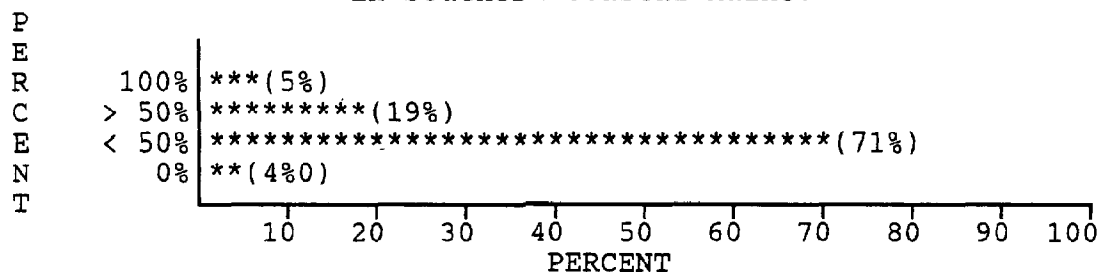
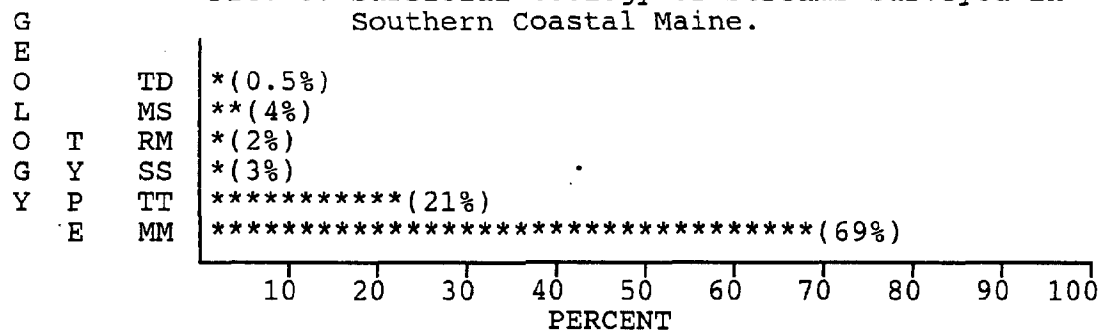


FIG. 6. Surficial Geology of Streams surveyed in Southern Coastal Maine.



MM = Fine-grained glaciomarine deposits
 TT = Glacial till deposits
 SS = Swamp, marsh, bog deposits
 RM = Ribbed morine deposits
 MS = Coarse-grained glaciomarine deposits
 TD = Thin drift deposits

FIG. 7. Observed Summer Temperatures of Streams surveyed in Southern Coastal Maine.

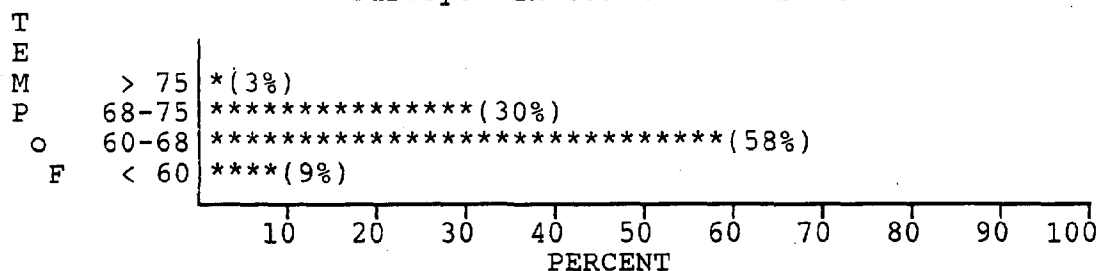


FIG. 8. Observed Dissolved Oxygen Concentrations of Streams surveyed in Southern Coastal Maine.

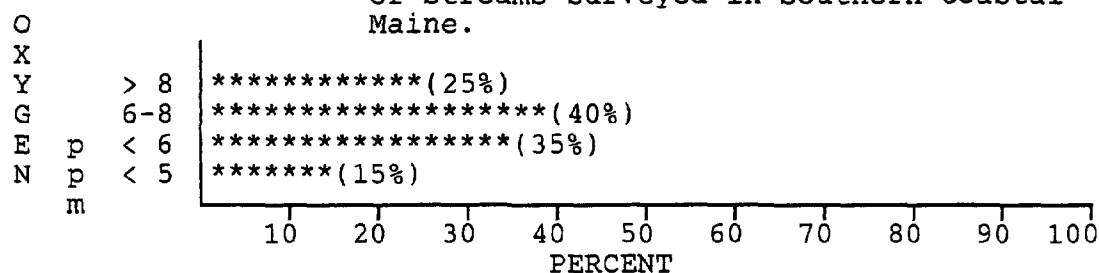


FIG. 9. Observed pH of Streams surveyed in Southern Coastal Maine.

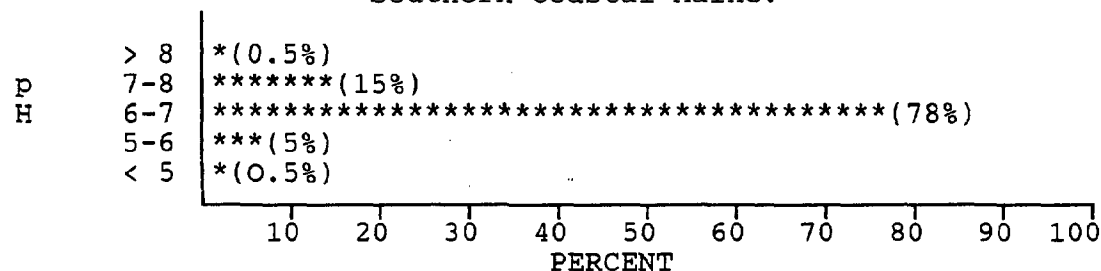
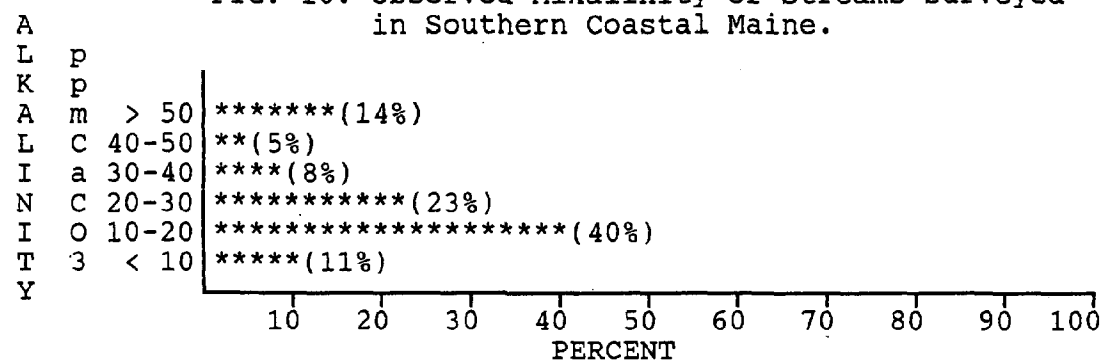
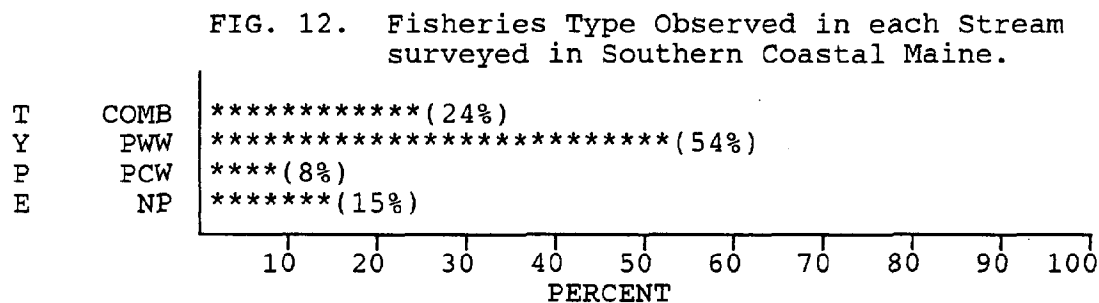
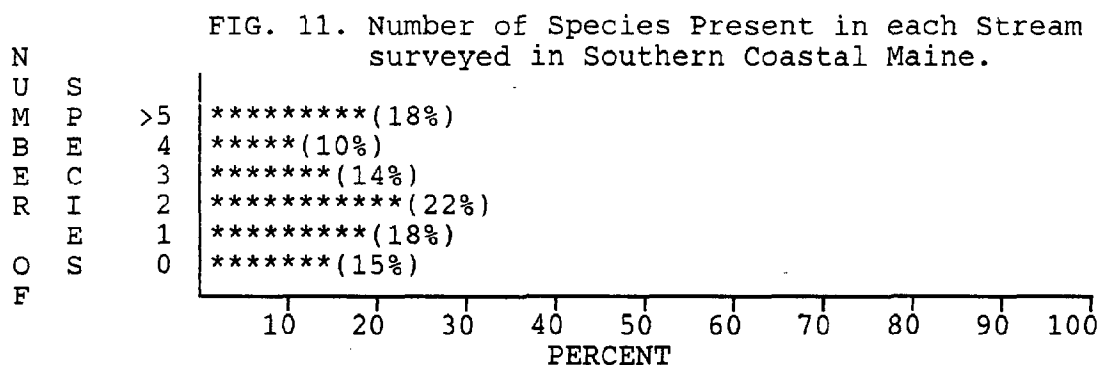
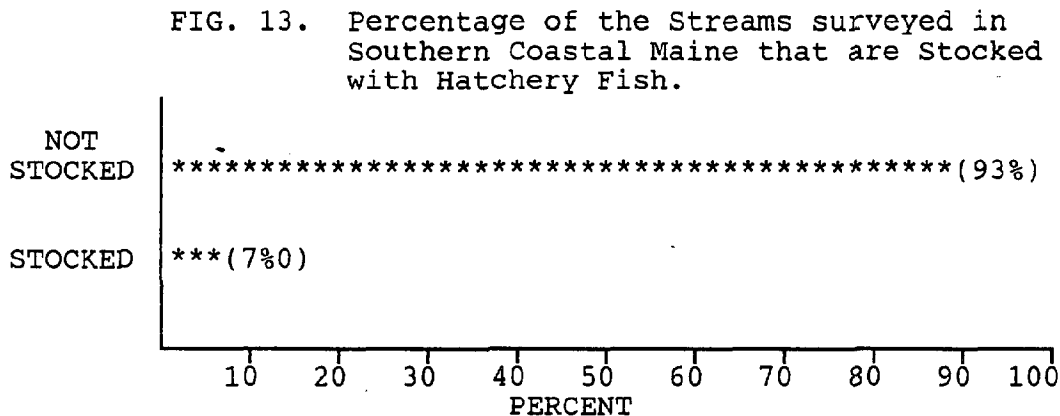


FIG. 10. Observed Alkalinity of Streams surveyed in Southern Coastal Maine.





NP = Non-principal fisheries present
 PCW = Principal coldwater fisheries present
 PWW = Principal warmwater fisheries present
 COMB = Combination warmwater, coldwater fisheries



volumes of cold water to support salmonid species, however, this lake is not actively managed by MDIFW due to an absence of public access. Highland Lake was the only water body in this study area having an official public right-of-way designated for public use. All other lakes are typically small and shallow, supporting an array of non-salmonid species.

Highland Lake had the highest score of all the lakes in the study area. Of the 17 lakes evaluated, two were rated as being a high value resource. An additional eleven were rated significant and the remainder were rated low for fisheries resource value. Spirit Pond in Phippsburg was a tidal pond and thus was not rated as a freshwater fisheries. All waters except Highland Lake and Forest Lake were relatively undeveloped. Most of the waters had no shoreline development present. Both Highland and Forest lake are heavily developed around the shoreline. The results of the ranking are summarized in Appendix 2 and a list of all fish species found in the study area is presented in Appendix I.

**MAINE STREAM STUDY:
METHODS FOR FISHERIES**

STREAM HABITATS:

Name of Stream: _____ Stream No. _____

County: _____ Township: _____

Drainage Name; _____ No.; _____

Habitat Units: _____ Total Score: _____

Complete this section for the entire category under consideration. Principal fisheries include all species either regulated or actively managed by MDIFW. Such species would include all those in PLANNING FOR MAINE'S INLAND FISH AND WILDLIFE, Volume II, Fisheries, 1986-1991. Non-principal fisheries would include non-sport and minnow species as indicated in the above mentioned document. Check the appropriate box for fishery type. For non-principal fisheries, complete Section B and for principal fisheries Section C. Determine the fishery types which exist in each stream using the best available information which may include electrofishing survey data and/or personal knowledge of the stream. Calculate the points for each sub-section using the appropriate Habitat Suitability Index Models (Blue Books) developed by the U. S. Dept. of Interior, Fish and Wildlife Service. Total the points and record in the "Total Score" space at the top of this page.

A. Fishery Type:

- _____ Non-principal fisheries present
- _____ Principal fisheries present:
 - _____ Non-salmonid species as principal fisheries
 - _____ Salmonid species as principal fisheries
 - _____ Both non-salmonid and salmonid species present as principal fisheries.

B. Non-Principal Fisheries Evaluation:

Streams with non-principal fisheries will be evaluated using three major criteria: abundance, species rarity, and economic importance. Each criteria will be rated as high, medium or low and receive a score of 3, 2 or 1, respectively.

1. Abundance.....

High = high abundance levels relative to other fisheries in the region.

Medium = medium abundance levels relative to other fisheries in the region.

Low = low abundance levels relative to other fisheries in the region.

2. Species Rarity.....

High = 1 or more species rare or uncommon in the State.

Medium = 1 or more species rare or uncommon in the Region.

Low = No rare or uncommon species.

3. Economic Importance.....

High = among the region's most important in terms of bait or food fish, etc...

Medium = some economic value to the region.

Low = limited economic significance.

4. Habitat Unit Value.....

High = stream area greater than 500 units (10 acres)

Medium = stream area 250 to 500 units (5 to 10 acres)

Low = stream area 1 to 250 units (1 to 5 acres)

SUMMARY

1. Abundance subtotal: _____

2. Species Rarity subtotal: _____

3. Economic Importance subtotal: _____

Total Points: _____

(Total Points: _____) X (Habitat Unit Value: _____) = _____
(Total Score)

C. Principal Fisheries Evaluation:

Streams with principal fisheries present will be evaluated using the following three major criteria: habitat suitability, species sensitivity and the following value factors: species abundance, species rarity, reproduction, fishing quality, aesthetic experiences and fishing pressure.

Habitat suitability will be determined using the HSI Models. If more than one species is present, average the HSI's for those species present. A high rating will be assigned to HSI's greater than 0.7; medium to HSI's from 0.3 to 0.7 and low for HSI's less than 0.3. A rating of high, medium and low will receive a score of 3, 2 and 1, respectively. The components of the suitability index will include the average of the physical feature variables of depth and substrate type added to the average of the chemical variables of dissolved oxygen and pH added to the variable of temperature. The scores of these components after being added together will be multiplied times two to determine the total points for the suitability criteria.

Species sensitivity will be determined by evaluating the sensitivity of the species or group of species to ecological changes in their habitat. Those species with the most broad tolerance to changes in the habitat suitability variables will be rated as low and those species with a narrow tolerance to changes in the habitat will be rated as high. Those species with moderate tolerance will be rated medium. A rating of high, medium and low will receive a score of 3, 2 and 1, respectively. The components of the sensitivity index will be the same variables used to determine habitat suitability. The scores will be average for each component, added together then multiplied times two to determine the total score for the sensitivity criteria.

Value Factors will include the following criteria: species abundance, species rarity, reproduction, fishing quality, aesthetic experiences, and fishing pressure. Each criteria will be rated as high, medium or low and receive a score of 3, 2 or 1, respectively.

1. Habitat Suitability:

$$\left(\left(\frac{\quad}{\text{physical features mean score}} \right) + \left(\frac{\quad}{\text{chemical var mean score}} \right) + \left(\frac{\quad}{\text{temp score}} \right) \right) \times (2) = \frac{\quad}{\text{subtotal score}}$$

2. Species Sensitivity:

$$\left(\left(\frac{\quad}{\text{physical features mean score}} \right) + \left(\frac{\quad}{\text{chemical var mean score}} \right) + \left(\frac{\quad}{\text{temp score}} \right) \right) \times (2) = \frac{\quad}{\text{subtotal score}}$$

3. Value Factors:

a. Abundance.....

High = high abundance levels relative to other
fisheries in the region

Medium = medium abundance levels relative to other
fisheries in the region

Low = low abundance levels relative to other
fisheries in the region

b. Species Rarity.....

High = 1 or more species rare or uncommon in the
State

Medium = 1 or more species rare in the region

Low = no rare or uncommon species

c. Reproduction.....

High = Fishery(s) entirely supported by natural
reproduction

Medium = Fishery(s) supported in part by stocking

Low = Fishery(s) supported totally by stocking

d. Fishing Quality.....

High = good overall size and/or catch experienced

Medium = fair size and/or catch rates experienced

Low = poor size and/or catch rates experienced

e. Aesthetic Experiences.....

High = above average experience

Medium = typical experience

Low = below average experience

f. Fishing Pressure.....

High = among the most heavily used for the region

Medium = moderate use for the region

Low = low use for the region

Value Factors Subtotal Score:

4. Habitat Unit Value.....

High = stream area greater than 500 units (10 acres)

Medium = stream area of 250 to 500 units (5-10 acres)

Low = stream area less than 250 units (5 acres)

SUMMARY

Habitat Suitability Subtotal: _____

Habitat Sensitivity Subtotal: _____

Value Factors Subtotal: _____

. Total Points: _____

(Total Points: _____) X (Habitat Unit Value: _____) = _____
Total Score

D. Special Unique Features Present: Yes _____; No _____

Describe any special or outstanding features of the area including special uses, unique physical features, traditional public use area, etc..., which makes this area unique or unusual.

**MAINE LAKE STUDY:
METHODS FOR FISHERIES**

Participants

Owen Fenderson, Fisheries Planner - general coordination
Kendall Warner, Management Supervisor - assessment approval
Regional Fisheries Biologists - lake assessors

Category Description

For the purpose of this assessment, a "fishery" is defined as any lake containing one or more cold water or warm water sport fish species in sufficient abundance to be regularly pursued by anglers, any lake that has the potential for supporting such a fishery, or any lake that contains non-sport fish species of significant economic, ecologic, or scientific value.

Information Sources

Published lake surveys
Computerized lake inventory file
Regional office files

Minimum Standards

To be included in the fisheries assessment, a lake must meet prescribed minimum standards. The first, common to all resource categories, is that a lake must be at least 10 acres in size and not be within Land Use Regulation Commission boundaries. Beyond this general standard, specific standards for fish resources have been identified. In combination, these standards identify lakes that are deemed to be the most important to DIFW's overall fishery management program. To be eligible for assessment a lake should meet the following minimum standards:

1. The lake must have a fishery or the potential for a fishery as defined above.
2. All natural lakes in excess of 10 acres or man-made lakes in excess of 30 acres (Great Ponds) that meet the definition of a fishery are to be included.
3. Any lake of a size less than a Great Pond that is judged to be an exceptionally high quality fishery is to be included. These waters should be chosen judiciously and would rate high among the criteria given below under "Evaluation Criteria."
4. All lakes that contain blueback charr, sunapee trout, swamp darters, brook sticklebacks, or grass pickerel will be automatically included.

Evaluation Criteria

Lakes meeting the minimum standards detailed above will be evaluated using three major criteria: species value, habitat value, and public use. Species and habitat values will be the major determinants of a lake's overall rating.

Each criterion has been subdivided into a number of specific factors. These factors and the measures by which lakes will be rated for each are as follows:

1. Species

a. Abundance

High = High abundance levels (number and/or weight, collectively for all species) relative to other fisheries in the region.

Medium = Medium abundance levels relative to other fisheries in the region.

Low = Low abundance levels relative to other fisheries in the region.

b. Diversity

High = 3 or more principal species in the fishery.

Medium = 2 principal species in the fishery.

Low = 1 principal species in the fishery.

c. Rarity

High = 1 or more species, rare or uncommon in the State.

Medium = 1 or more species, rare in the region.

Low = No rare or uncommon species.

d. Reproduction

High = Fishery(s) entirely supported by natural reproduction.

Medium = Fishery(s) supported in part by stocking.

Low = Fishery(s) supported totally by stocking.

2. Habitat

Note: Habitat quality factors will be evaluated from the perspective of all important species in the fishery rather than any one particular species.

a. Water Quality

High = Optimum DO, pH, etc. Production not limited by water quality.

Medium = Production somewhat limited by water quality.

Low = Production severely limited by water quality.

b. Physical Factors

High = Optimum food, substrate, spawning areas, etc.

Medium = Production somewhat limited by food, substrate, spawning areas, etc.

Low = Production severely limited by food, substrate, spawning areas, etc.

3. Public Use

a. Fishing Quality

High = Good overall size and/or catch rates experienced by anglers.

Medium = Fair size and/or catch rates experienced by anglers.

Low = Poor size and/or catch rates experienced by anglers.

b. Aesthetic Experience

High = Among the best fishing experiences in the region in terms of scenery, solitude, and/or other amenities.

Medium = Typical in the region in terms of fishing experience.

Low = Sub-par fishing experience.

c. Fishing Pressure

High = Among the most heavily used fisheries in the region.

Medium = Moderate use for the region.

Low = Low use for the region.

d. Economic Importance

High = Among the region's most important in terms of tourism supporting local services and guides, commercial bait fish, etc.

Medium = Some economic value to the region.

Low = Limited economic significance.

4. Potential

Enter a "P" in the comment column if the water has potential for a higher rating if certain management procedures could be implemented. For example, the pond might have the potential for being reclaimed.

5. Management

Indicate the species group for which the water is currently being managed using the following letter codes:

C = coldwater species
W = warmwater species
B = both coldwater and warmwater

Leave blank if the water is not being managed for sport fisheries. Note: Codes for surveyed waters have been entered by computer. If incorrect indicate the correct code.

Evaluation Process

1. Field Evaluation

A response form consisting of the master list of lakes and a series of data entry columns will be supplied to state fisheries managers in each DIFW region. Regional biologists will be asked to :

- (1) identify lakes that meet the study's minimum standards,
- (2) rate the habitat and species value of each lake meeting minimum standards, and
- (3) rate the public use value of each lake meeting the minimum standards.

As the initial step, biologists will compare the prepared lake list with the minimum standards identified earlier, checking off those that meet these standards. No set number of lakes must meet minimum standards. The actual number will likely vary according to the number of lakes in each region.

For those lakes meeting minimum standards, habitat, species, and public use factors will be rated using the high (H), medium (M), or low (L) designations detailed above. Specific sources of information may include creel censuses, data logs from field inventories, and professional judgement. A medium rating will signify a typical, good quality fishery such as associated with many of the State's lakes. A high rating will be reserved for especially noteworthy occurrences.

The response form will include space for comments. This may be used to highlight noteworthy characteristics (names of critical species, unique habitats, etc.) or to provide other necessary information. While ratings are to be made from the perspective of existing conditions and existing data sources, potential for improvement can be noted in the comment column. Biologists are not expected to provide comments on every lake.

2. Encoding and Analysis

After forms are returned, information will be entered into the DIFW computer. DIFW state level staff will analyze data and give tentative ratings to lakes based on data supplied by field personnel. Lakes will be rated as "outstanding" or "significant." The following will serve as guidelines for this process:

- a. Species and habitat values will, in combination, be the major rating factors. A lake need not receive a high (H) rating in all species and habitat measures to receive a high overall rating.

Species, habitat, and public use values will be totalled for each lake. High values will be assigned a value of three, medium values will be assigned a value of two, and low values will be assigned a value of one.

Preliminarily, lakes with total values of 24 or more points will be rated outstanding and lakes with 14-23 points will be rated significant.

- b. Lakes with critical species will automatically be given an outstanding rating.
- c. Outstanding" designations will be limited to the most significant from either a DIFW region or statewide perspective.

MAINE ORGANIZED TOWNS LAKE ASSESSMENT COMMENT FORM: FISHERIES

NAME(S):
DATE:

REGION

TOUIN

LAKE

CONTENTS

This image shows a single page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, typical of notebook paper. There is no handwriting or other markings on the page.

Appendix 5. List and Definition of Wetland Types

TYPE 1 - Seasonally Flooded Basins or Flats.

These flats occur in upland depressions, which may fill with water during periods of heavy rain or melting snow, and along river courses, where flooding ordinarily occurs in late fall, winter, or spring. The soil is covered with water or is waterlogged during variable seasonal periods, but is generally well-drained during the growing season. Where the water recedes early, smartweeds, fall panicum, chufa, wild millet, and cockleburrs are likely to occur.* Areas that are only temporarily submerged rarely develop any wetland vegetation. Ducks often use flooded upland depressions when feeding - eating seeds that were present before flooding and invertebrates that developed wither before or after submergence.

TYPE 2 - Inland Fresh Meadow.

These meadows often fill shallow lake basins or potholes; they may also be found bordering the landward side of shallow marshes. The soil is waterlogged to within a few inches of the surface during the growing season. Vegetation characteristic of northern meadows includes cares, rushes, reedtop, reed grasses, mannagrasses, prairie cordgrass, and mints. When associated with permanent water areas, fresh meadows are commonly used by nesting waterfowl. Deer and moose frequent them while resting and feeding.

TYPE 3 - Inland Shallow Fresh Marsh.

Shallow marshes may nearly fill shallow lake basins or potholes, or they may border the landward side of deep fresh marshes occupying such depressions. The soil, normally waterlogged during the growing season, may be flooded with as much as 6 inches of water. Common plant species found in northern regions are plume grass, rice cutgrass, carex, and giant burreed. Various other marsh plants (cattails, arrowheads, pickerel weed, smartweeds) may also be found. These marshes are used heavily by nesting and feeding waterfowl, and they are visited frequently by other birds, moose, deer, and various furbearers.

TYPE 4 - Inland Deep Fresh Marsh.

These marshes often occupy shallow lake basins and potholes, or they may border open water occurring in such areas. The soil is covered with 6 inches to 3 feet of water during the growing season. Shallow-water vegetation consists mainly of cattails, plume grass, spikerushes, and

* The scientific names of all plants mentioned here and on the following pages are listed at the end of this Appendix.

wild rice; pondweeds, duckweeds, coontail, spatterdock sometimes occur in the more open areas. These areas are important not only to nesting and feeding waterfowl, but also to numerous other wildlife species, such as herons and rails, muskrats, otters, and beavers, turtles, frogs, and fish.

TYPE 5 - Inland Open Fresh Water.

Open fresh water of variable depth occurs in artificial lakes, ponds, and reservoirs. It may also be found in shallow lake basins, potholes, or streambeds, and is commonly fringed with marsh vegetation. In shallow areas (less than six feet) vegetation may include pondweeds, wild celery, coontail, water milfoil, water lilies, and spatterdocks. These open water areas are useful to diving ducks, coots, and occasionally to geese. The bordering vegetation provides cover and the open surface areas are particularly good for brooding and resting.

TYPE 6 - Shrub Swamp.

Shrubby swamps occur primarily along sluggish streams. The soil is generally waterlogged but may be covered with a foot or more of water. Alder and dogwood predominate on the drier areas; willow, buttonbush, and sweet gale characterize the wetter sites. These swamps are used to varying degrees by ducks, moose, deer, woodcock, and raccoons.

TYPE 7 - Wooded Swamp.

These swamps occur along sluggish streams, on flat uplands, and in shallow lake basins or potholes. The soil is normally waterlogged but may be seasonally covered with as much as one foot or more of water. (When such areas are flooded for a period of one or more years, the trees die and the site reverts to a meadow for a period of one or more years, the trees die and the site reverts to a meadow association). Northern swamps are composed of tamarack, arborvitae, black spruce, balsam fir, red maple, and black ash. The coniferous swamps usually have a thick carpeting of mosses; deciduous swamps often support duckweeds, smartweeds, and other herbaceous vegetation. Wooded swamps are frequently used by hole-nesting ducks, feeding waterfowl, deer, moose, beaver, and numerous small birds and mammals.

TYPE 8 - Bog.

Bogs occur most often in shallow lake basins, and potholes, along sluggish streams, and on flat uplands. The soil is generally saturated and supports a spongy ground-cover of mosses or other plant material. Vegetation may be woody, herbaceous, or both. Northern representatives

include Labrador-tea, leather-leaf, cranberries, carex, cottongrass, sweet gale and sphagnum moss. Stunted black spruce and tamarack may also occur. In Maine, these bogs, especially those with an interspersed of open water, are of importance to some nesting waterfowl. Moose, deer, beaver, and hares also frequent these areas.

TYPE 12 - Coastal Shallow Fresh Marsh.

These marshes occur along tidal rivers and adjacent the landward side of deeper marshes. The soil is waterlogged and may be flooded with as much as 6 inches of water at high tide. Vegetation consists of various grasses and sedges, cattails, arrowheads, smartweeds, and arrow-arum. These marshes are highly important to feeding wildfowl and herons; they are of lesser importance to mink, raccoons, and snipe.

TYPE 13 - Coastal Deep Fresh Marsh.

These deep marshes occur primarily along tidal rivers. During the growing season the soil is covered with 6 inches to 3 feet of water at average high tide. Common plants found are cattails, wildrice, pickerel weed, and spatterdocks; pondweeds, widgeon grass, and other submerged species often occur in marsh openings. Where suitable vegetation dominates, these marshes are heavily used by feeding waterfowl, sora rails, and herons. Raccoons, mink, muskrats, and fish also utilize these areas.

TYPE 14 - Coastal Open Fresh Water.

These waters are of variable depth and occur in tidal rivers and sounds. Vegetation is generally found at depths less than six feet and consists of pondweeds, naiads, wild celery, coontail, water milfoils, and waterweeds. Such areas are heavily used by diving ducks and other water birds, and by fish.

TYPE 16 - Coastal Salt Meadow.

Salt meadows border the landward side of salt marshes, or open water. The soil is always saturated during the growing season but is rarely inundated by tidal water. Indigenous plant species are salt meadow cordgrass (*Spartina patens*) and black rush; common three-square occurs in fresher areas. Salt meadows are of great importance to resident and wintering waterfowl, particularly when well interspersed with potholes and ditches. Such areas support large populations of amphipods, clams, and snails, and afford wildfowl an ample source of food.

TYPE 18 - Regularly Flooded Salt Marshes.

Salt marshes occur most often along coastal bays. At

average high tide during the growing season, the soil is covered with six inches or more of water. The predominant plant species is saltmarsh cordgrass (*Spartina alterniflora*). Open water areas often support widgeon grass, eelgrass, and Sago pondweed. Feeding wildfowl use these wetlands heavily, as do herons, rails, other shore birds, fish, and shellfish.

TYPE 19 - Sounds and Bays.

This type consists primarily of mud flats laid bare at low tide and occurring along salt-water rivers, sounds, and bays. Vegetation, if present, may consist of eel-grass, widgeon grass, Sago pondweed, and muskgrasses. These tidal flats support large shellfish populations and are extremely important to wintering waterfowl populations.

- It should be emphasized that each of these wetland types is generally found in conjunction with one or more of the other types; very seldom will an area be found that is entirely fresh meadow or entirely deep fresh marsh. When classifying a wetland, select the type which most closely identifies the greater portion (50-75%) of the area as it is delineated on the map.

Glossary of Plant Names

These are the common and scientific names of plants referred to in this appendix (from Fernald, 1950 and Fassett, 1957).

Common Names	Scientific Names
Alders	<i>Alnus</i> spp. B. Ehrh.
Arborvitae	<i>Thuja occidentalis</i> L.
Arrow-arum	<i>Peltandra virginica</i> (L.) Kunth.
Arrowheads	<i>Sagittaria</i> spp. L.
Balsam Fir	<i>Abies balsamea</i> (L.) Mill.
Black Ash	<i>Fraxinus nigra</i> Marsh.
Blackrush	<i>Juncus gerardi</i> Loisel.
Black spruce	<i>Picea mariana</i> (Mill.) BSP
Bulrushes	<i>Scirpus</i> spp. L.
Buttonbush	<i>Cephalanthus occidentalis</i> L.
Carex	<i>Carex</i> spp. L.
Cattails	<i>Typha</i> spp. L.
Chufa	<i>Cyperus esculentus</i> L.
Cocklebur	<i>Xanthium</i> spp. L.
Common three-square	<i>Scirpus americanus</i> Pers.
Coontail	<i>Ceratophyllum demersum</i> L.
Cottongrass	<i>Eriophorum</i> spp. L.
Cranberries	<i>Vaccinium</i> spp. L.
Dogwoods	<i>Cornus</i> spp. L.
Duckweeds	Lemnaceae
Eelgrass	<i>Zostera marina</i> L.
Fall panicum	<i>Panicum dichotomiflorum</i> Michx.
Giant burreed	<i>Sparganium eurycarpum</i> Engelm.
Grasses	Gramineae
Labrador-tea	<i>Ledum groenlandicum</i> Oeder.
Leatherleaf	<i>Chamaedaphne calyculata</i> (L.) Moench.
Mannagrasses	<i>Glyceria</i> spp. R. Br.
Mints	Labiatae
Muskgrasses	<i>Chara</i> spp. L.
Naiads	<i>Najas</i> spp. L.
Pickrel weed	<i>Pontederia cordata</i> L.
Plumegrass	<i>Phragmites communis</i> Trin.
Pondweeds	<i>Potamogeton</i> spp. L.
Prairie cordgrass	<i>Spartina pectinata</i> Link.
Red Maple	<i>Acer rubrum</i> L.
Redtop	<i>Agrostis stolonifera</i> L.
Reed grasses	<i>Calamagrostis</i> spp. Adams.
Rice cutgrass	<i>Leersia oryzoides</i> (L.) Swartz.
Rushes	<i>Juncus</i> spp. L.
Sago pondweed	<i>Potamogeton pectinatus</i> L.
Saltmarsh cordgrass	<i>Spartina alterniflora</i> Loisel.
Saltmeadow cordgrass	<i>Spartina patens</i> (Ait.) Muhl.
Sedges	Cyperaceae

Smartweeds
Spatterdocks
Sphagnum moss
Spikerushes
Sweet gale
Tamarack

Water lilies
Water milfoils
Waterweeds
Widgeon grass
Wild celery

Wild millet
Wild rice
Willow

Polygonum spp. L.
Nuphas spp. Sm.
Sphagnum spp.
Eleocharis spp. R. Br.
Myrica gale L.
Larix laricina (DuRoi) K.
Koch

Nymphaea spp. L.
Myriophyllum spp. L.
Elodea spp. Mich.
Ruppia marinima L.
Vallisneria americana
Michx.
Echinochloa spp. Beauv.
Zizania aquatica L.
Salix spp. L.

**Appendix 6. Evaluation Criteria Used For
Rating Deer Wintering Areas.**

<u>Criteria</u>	<u>Least Desirable Condition</u>	<u>Most Desirable Condition</u>
1) <u>Access</u>	Far from any all- weather road	Close to all- weather road
2) <u>Shelter Quality</u>		
Forest Composition:	Hardwood dominated mixed wood stands	Softwood stands
Stand Size:	Softwood stands w/ numerous large inclusions of hard- wood	Large, contiguous softwood stands
Aspect:	North	South
3) <u>Browse Availability</u>		
Browse currently available:	No available browse of any species	Abundant amt. of preferred browse species
Potential to produce browse:	No hardwood present in canopy or under- story	Good inter- spersion of hardwood in softwood canopy and understory
4) <u>Relationship to Other DWAs:</u>	Within 1/2 mile or less of another DWA	3-5 miles or more to the closest DWA
5) <u>Size</u>		
Shape:	Round	High linearity
Size:	< 20 acres	> 500 acres
6) <u>Deer Population:</u>	Light, sporadic deer use	Heavy, continuous deer use

<u>Criteria</u>	<u>Least Desirable Condition</u>	<u>Most Desirable Condition</u>
7) <u>Operability of Stands</u>		
Drainage:	Wet site	well-drained site
Slope:	Very steep	Flat
Surface Obstructions:	Numerous ledge out-croppings, very rocky	No surface obstructions

Appendix 7. Maine Endangered and Threatened Species

I. Endangered Species

Bald Eagle (Haliaeetus leucocephalus) *
Peregrine Falcon (Falco peregrinus) *
Golden Eagle (Aquila chrysaetos)
Piping Plover (Charadrius melodus) **
Least Tern (Sterna antillarum)
Roseate Tern (Sterna dougallii) *
Sedge Wren (Cistothorus platensis)
Grasshopper Sparrow (Ammodramus savannarum)
Right Whale (Eubalaena glacialis) *
Humpback Whale (Megaptera novaeangliae) *
Finback Whale (Balaenoptera physalus) *
Sperm Whale (Physeter catodon) *
Sei Whale (Balaenoptera borealis) *
Leatherback Turtle (Dermochelys coriacea) *
Atlantic Ridley Turtle (Lepidochelys kempi) *
Box Turtle (Terrapene carolina)
Black Racer (Coluber constrictor)

II. Threatened Species

Tundra Peregrine Falcon (Falco peregrinus tundrius) **
Northern Bog Lemming (Synaptomys borealis)
Loggerhead Turtle (Caretta caretta) **
Blanding's Turtle (Emydoidea blandingii)
Spotted Turtle (Clemmys guttata)

* Federally Listed Endangered Species

** Federally Listed Threatened Species

Appendix 8: Open Space for Wildlife - Methods.

STEP I: Preliminary Assessment

Study Area. All 17 towns within the study area are also within Wildlife Management Unit (WMU) 8 and this WMU comprises the study area (Fig. 1). Wildlife Management Units were established by the Maine Department of Inland Fisheries and Wildlife to group areas with similar climate, land use, topography, human population and habitats. It is intended that the procedure for evaluating open space be flexible enough to be used throughout Maine once the relative abundance of habitats and wildlife species are calculated for each WMU. This report only concerns itself with the area within WMU 8.

Habitat Types. Habitat types were defined using information from DeGraaf and Rudis (1986) and the U.S. Forest Service Survey as compiled by the Maine Department of Inland Fisheries and Wildlife (1984). Special habitat types were grouped into sixteen general habitats (Table 1).

Modifications of habitat types from definitions in DeGraaf and Rudis (1986) were made to simplify the evaluation process. A cultivated field included active agriculture, grass, or orchards, and a fallow field included shrub/old field, forbs, pasture or savanna. The high elevation cover types were not included in this study.

Trees ranging in size from regeneration to poletimber were classified as young growth, and small and large sawtimber were considered mature growth. Spruce/fir forests were defined as any stand where balsam fir or red spruce predominated. Pine/hemlock forests were defined as any stand of predominately white pine, red pine, pitch pine, or eastern hemlock. Northern hardwoods included aspen, birches, maples, oaks, beeches, or ash. The transitional pine/oak/red maple forest classification was excluded because it was not a significant cover type according to the U.S Forest Service survey in Maine (less than 2% of the total forest-cover type in Maine).

Five types of wetlands were classified. The first type included deep marsh habitat. Shallow marsh and sedge meadow were classified together. Wooded swamps and shrub swamps were also classified together and coastal estuaries and bays were a fourth type. Bogs were classified separately. Ponds and lakes were considered if 10 acres or more, and streams if they drained at least 5 square miles.

Riparian areas were not treated separately, but rather their value was added to that of the associated aquatic habitat.

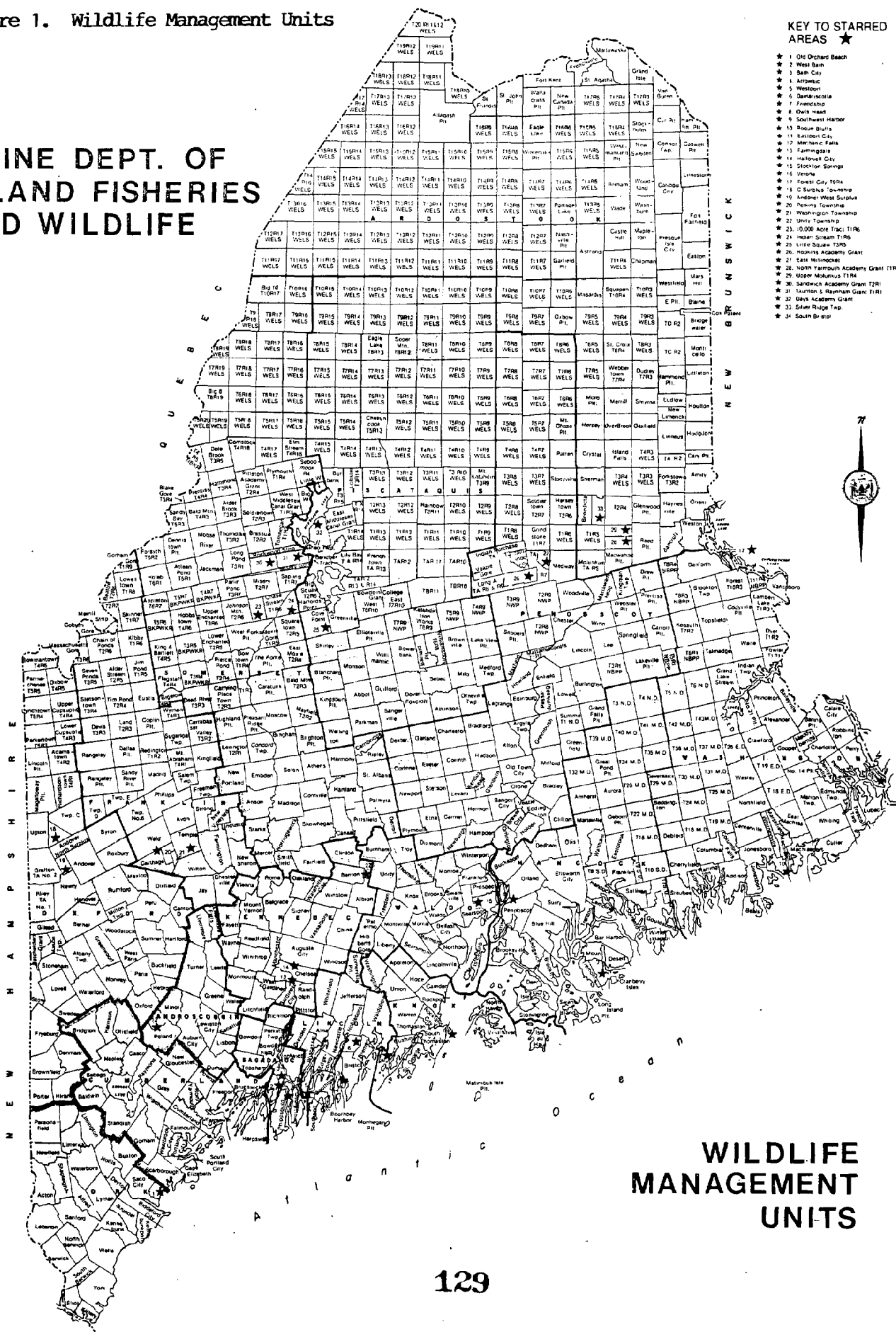
Wildlife-Habitat-Relationship Model. A wildlife habitat

Figure 1. Wildlife Management Units

MAINE DEPT. OF INLAND FISHERIES AND WILDLIFE

KEY TO STARRED AREAS ★

- ★ 1 Old Orchard Beach
- ★ 2 West Bath
- ★ 3 Bath City
- ★ 4 Arrowsic
- ★ 5 Westbrook
- ★ 6 Scarborough
- ★ 7 Frenchboro
- ★ 8 Orono
- ★ 9 Southwest Harbor
- ★ 10 Bangor
- ★ 11 Eastport
- ★ 12 Mechanic Falls
- ★ 13 Farmington
- ★ 14 Hallowell City
- ★ 15 Stockton Springs
- ★ 16 Vero
- ★ 17 Forest City
- ★ 18 O. Surber's Township
- ★ 19 Andover West Surber
- ★ 20 Newburg Township
- ★ 21 Washington Township
- ★ 22 Unity Township
- ★ 23 10,000 Acre Tract
- ★ 24 Indian Stream Tract
- ★ 25 Little Square Tract
- ★ 26 Upper Moulton Tract
- ★ 27 East Moulton
- ★ 28 North Yarmouth Academy Grant Tract
- ★ 29 Upper Moulton Tract
- ★ 30 Sandwich Academy Grant Tract
- ★ 31 Hallowell & Rye Brook Tract
- ★ 32 Davis Academy Grant
- ★ 33 Silver Ridge Tract
- ★ 34 South Bristol



**WILDLIFE
MANAGEMENT
UNITS**

Table 1. Sixteen general habitat types defined for the open space evaluation.

<u>Category</u>	<u>Habitat Type</u>
Fields	1) Cultivated field/orchard/ gravel pit
	2) Fallow field/pasture/log landing
Softwoods	3) Young spruce/fir
	4) Mature spruce/fir
	5) Young pine/hemlock
	6) Mature pine/hemlock
Hardwoods	7) Young Northern Hardwoods/ mixed wood
	8) Mature Northern Hardwood/ mixed wood
Wetlands	9) Deep marsh
	10) Shallow marsh/sedge meadow
	11) Wooded/shrub swamp
	12) Estuary/salt marsh
	13) Bog/fen
Lakes	14) Pond/lake
Rivers	15) Brook/Stream/River
Riparian	16) Riparian

relationship (WHR) model systematically organizes existing information on the relationships between wildlife and certain habitats and serves as a useful tool for land use planners (Ohmann 1983). It should be emphasized that this model is not meant to be predictive and that its primary use is for determining the relative value of a particular site as wildlife habitat. Biases inherent in the model are assumed to be spread equally across habitat types. Site evaluations (step II in this report) are an essential component of this method.

Once general habitats were defined, the full range of species potentially occupying each habitat were listed. The relative abundance of each animal within a habitat type was rated on a scale of zero to five (0 = not present, 1 = rare, 2 = uncommon, 3 = locally common, 4 = common, 5 = abundant). for each of four seasons: breeding, breeding and feeding, wintering, and winter feeding. Breeding was defined as the time in which any particular animal mates and rears its young, and wintering was defined as the time where breeding activity is absent. Feeding during breeding or wintering often occurs at sites separate from the primary habitat and was therefore included as separate categories. All vertebrates were included in this evaluation (i.e. birds, mammals, reptiles, amphibians).

DeGraaf and Rudis (1986) was the primary source of information used in this evaluation. However, sources more specific to Maine were also used in determining species abundance and distribution whenever available. Other sources included Arbuckle and Kellogg (1986), Hunter (1984), Elliott (1982), Godin (1977), Lortie and Pelletier (1987), and P. Vickery (pers. comm.). In addition, each estimate of species abundance within a habitat and season was reviewed by at least 3 experts for consistency and accuracy.

Seasonal biological value indices ¹⁾ were calculated for each habitat type by summing the numbers for species abundance for each season within each habitat and dividing by the highest number attained for any habitat in any season. This resulted in each habitat having four seasonal indices. A composite biological value index was calculated in similar fashion by summing seasonal abundance values for each habitat and dividing that number by the highest value

1) Indices are unitless numbers bounded by zero and one, where zero indicates the lowest or least suitable habitat and one indicates the optimum habitat (U.S. Fish and Wildlife Service 1980a). Since all habitats are valuable to at least some types of wildlife, the value of zero is merely hypothetical. Actual indices will fall somewhere between zero and one.

attained for any single habitat. The habitat with the highest combined seasonal biological value index was considered most valuable and became the standard by which all other habitats were compared. By definition, the highest scoring habitat received a composite biological value index of 1.0. This procedure was based on the U.S. Fish and Wildlife Service's models of habitat suitability and is similar to the procedure used to evaluate marine wildlife in coastal Maine by Woodward et.al. (1986). Finally, each index of biological value was multiplied by 10. Such weighting allowed for easier comparisons by moving the decimal point.

STEP II: Habitat Availability

The proportion of land in each cover type per WMU was determined from the 1980 U.S. Forest Service Survey of Maine. These figures were subtracted from 1.0 to give a measure of relative scarcity within the WMU. Finally these figures were multiplied by a weight of 5 to yield an availability score.

The availability of aquatic resources was calculated separately using MDIF&W inventories. The percent cover of ponds (10 acres or more) were calculated for each WMU. The percent cover of brooks, streams, and rivers was determined using available stream inventory data and assuming each waterway had an average width of 10 feet. The proportion of wetland in each category per WMU was then determined and these figures were subtracted from 1.0 to give a measure of relative scarcity within the WMU. Finally, these figures were multiplied by a weight of 5 to yield an availability score. A weight of 5 was used for availability to make its importance half of the level of the biological value.

Step III: Site Assessment

Once the preliminary assessment has been computed for each WMU, site visits may be conducted to determine the actual value of particular sites. Information collected from site visits is recorded and quantified using seven general categories: 1) Biological Values and Habitat Availability, 2) Special Components, and 3) Surrounding Features (Appendix 3).

Biological Values and Habitat Availability: Cover types of a site may be determined from aerial photos prior to the site visit or from traversing the site on foot. Either method allows one to determine the presence of specific habitat types, previously described, within the boundaries of the site. Once identified as being present, the amount in acres of each habitat type on the site is estimated. For each habitat type present, points are calculated by combining habitat availability and biological scores.

Special Components: Special components include but are not limited to critical nongame habitats, deer wintering areas, important fishery resources, wetlands, and seabird nesting islands. Maps included with this report identify special components as evaluated by the Maine Department of Inland Fisheries and Wildlife, but local knowledge of features important to fish and wildlife should also be considered. Furthermore, information on important fish and wildlife areas continues to be collected by MDIFW and such areas should be considered as they are identified. For each special feature that is either wholly or partially within the site, add 500 points for high or moderate value features, and add 100 points for low value features.

Surrounding Features: Larger sections of undeveloped land offer greater opportunities for supporting wildlife. Animals with larger home ranges (eg. deer, moose, or bobcat) are more likely to occur and animals with smaller home ranges are more abundant. Adjacent undeveloped land can significantly increase the value of the land being evaluated. One hundred points are added to each score for the presence of adjacent tracts of undeveloped land greater than 50 acres, adjacent tracts of land already protected that are greater than 50 acres in size, and adjacent tracts of land with high or moderate value special components.

Step IV: Acquisition

Vulnerability, Other Values, and Potential for Habitat Improvement are three categories that are included only for land being evaluated for acquisition. Conservation organizations, state or town governments, or interested citizens may want to incorporate some of the following resource values into land use policies:

Vulnerability: Land that is vulnerable to major habitat changes (ie. development) in the near future is threatened with destruction. Realizing this, land with a high vulnerability is awarded 100 points, land with a medium vulnerability is given 60 points, land with a low vulnerability is given 20 points, and land with no vulnerability is not given any points.

Other Values: Points are awarded for values that an area may have, which although not directly related to fish and wildlife management, would increase the value of the area for public ownership. Fifty points are added for the presence of each of the following: multiple recreational opportunity, outstanding scenic value, outstanding natural features, outstanding historical or cultural features, outstanding educational opportunities, or existing public access.

Potential for Habitat Improvement: Active management (dam

repair or construction, forest operations, etc.) can enhance the fisheries and wildlife values of a piece of land. Points are awarded based on the potential for habitat improvement; high potential areas are given 50 points, moderate potential areas are given 30 points, and low potential areas are given 10 points. No points are awarded if an area has no potential for habitat improvement.

Comments: A comments section is included so that any special or outstanding features of an area that were not included in the above categories can be mentioned.

Habitat Evaluation Form

Name of Area: _____

Location (town): _____

WMU: _____ Area (acres): _____ Size Factor (s.f.): $\frac{\text{Area}}{1000} =$ _____

Date Completed: _____ Site Visit (date): _____

Source of Information: _____

I. Biological Value, Habitat Availability, and Diversity

Complete this section for the entire area under consideration. Determine the habitat categories which occur on the area using the best available information. Habitat categories must be at least 1 acre in size to be considered a distinct habitat. Check the boxes of the categories which occur on the area. Record the availability scores for these habitat types from the table for the appropriate WMU. Estimate the area in acres or length in tenths of miles for brooks, streams, and rivers, for each habitat category. Calculate the points for each habitat category and total separately for Upland and Aquatic Habitat. Calculate the diversity subtotal by recording the number of habitat types which occur on the area, subtract 1, and multiply by the point value. Multiply the diversity subtotal by the size factor (s.f.) and record on the summary at the end of the form.

A. Upland Habitat

<u>Occurs</u>	<u>Biological Value</u>	<u>Availability</u>	<u>Area (Acres)</u>	<u>Points</u>
<input type="checkbox"/> 1. Cultivated field/ orchard/gravel pits	(5.5	+ _____)	x _____	_____
<input type="checkbox"/> 2. Fallow field/pastures/ log landings	(8.6	+ _____)	x _____	_____
<input type="checkbox"/> 3. Spruce fir - young	(6.0	+ _____)	x _____	_____
<input type="checkbox"/> 4. Spruce fir - mature	(6.7	+ _____)	x _____	_____
<input type="checkbox"/> 5. Pine/hemlock - young	(6.7	+ _____)	x _____	_____
<input type="checkbox"/> 6. Pine/hemlock - mature	(7.8	+ _____)	x _____	_____
<input type="checkbox"/> 7. Northern hardwoods/ mixed - young	(9.3	+ _____)	x _____	_____
<input type="checkbox"/> 8. Northern hardwoods/ mixed - mature	(10.0	+ _____)	x _____	_____

Upland Habitat TOTAL _____

B. Aquatic Habitat¹

<u>Occurs</u>		<u>Biological Value</u>		<u>Availability</u>		<u>Area (Acres)</u>	<u>Points</u>
<input type="checkbox"/> 1.	Deep marsh	(9.8	+	_____)	x	_____	_____
<input type="checkbox"/> 2.	Shallow marsh/sedge meadow	(9.4	+	_____)	x	_____	_____
<input type="checkbox"/> 3.	Wooded/shrub swamp	(10.0	+	_____)	x	_____	_____
<input type="checkbox"/> 4.	Estuary/salt marsh	(9.2	+	_____)	x	_____	_____
<input type="checkbox"/> 5.	Bog/fen	(9.0	+	_____)	x	_____	_____
<input type="checkbox"/> 6.	Open freshwater	(8.6	+	_____)	x	_____	_____
<input type="checkbox"/> 7.	Brook/stream/river	(8.6	+	_____)	x	_____	* _____

AQUATIC HABITAT TOTAL _____

C. Diversity. Points will be awarded for the variety of habitat types which occur on the area corrected by its size.

Habitat Types

(_____ - 1) x 100

Subtotal _____

Size Factor X _____

Diversity Total _____

II. Special Components. Points will be awarded based on the special components which occur on the area corrected by its size.

Part A. Add 500 points for each of the following special habitats if wholly or partially within area and rated HIGH or MODERATE:

<u>Occurs</u>	<u>Habitat</u>	<u>#</u>	
<input type="checkbox"/>	Deer wintering area	_____	_____
	Critical non-game habitat (list):		
<input type="checkbox"/>	_____	_____	_____
<input type="checkbox"/>	_____	_____	_____
<input type="checkbox"/>	_____	_____	_____
<input type="checkbox"/>	Fisheries stream or pond	_____	_____

SUBTOTAL _____

Size Factor X _____

Special Components A Total _____

¹) Biological value scores for aquatic habitats have been adjusted upward to reflect the importance of the riparian habitat which occurs in conjunction with them.

Part B. Add 100 points for each of the following special habitats if wholly or partially within area and rated LOW:

<u>Occurs</u>	<u>Habitat</u>	<u>#</u>	<u>Points</u>
<input type="checkbox"/>	Deer Wintering Area	_____	_____
<input type="checkbox"/>	Critical non-game habitat (list):		
<input type="checkbox"/>	_____	_____	_____
<input type="checkbox"/>	_____	_____	_____
<input type="checkbox"/>	_____	_____	_____
<input type="checkbox"/>	Fisheries stream or pond	_____	_____
SUBTOTAL			_____
Size Factor X			_____
Special Components B Total			_____

III. Surrounding Features. Points will be awarded based on surrounding features which improve the area, by its corrected size.

Add 100 points for the presence of each of the following:

<u>Occurs</u>		
<input type="checkbox"/>	Adjacent to other tracts of undeveloped land (at least 50 acres):	_____
<input type="checkbox"/>	Adjacent to other tracts of protected land (at least 50 acres):	_____
<input type="checkbox"/>	Adjacent to other tracts of land with a special component (see section II) of high or moderate value:	_____
SUBTOTAL		_____
Size Factor		X _____
Surrounding Features Total		_____

COMPLETE THE REMAINING SECTION ONLY IF THIS IS AN EVALUATION FOR ACQUISITION.

IV. Vulnerability. Points will be awarded based on the vulnerability of the area, corrected by its size.

Estimate the likelihood that major land-use changes (development, land-clearing, etc.) will occur on this area in the next 10 years (check one):

- ☐ High (Add 100 points)
☐ Medium (Add 60 points)
☐ Low (Add 20 points)
☐ None (no points)

SUBTOTAL _____
Size Factor X _____
Vulnerability Total _____

V. Other Values. Points will be awarded for other values of the area which, although not directly related to fish and wildlife management, would increase the value of this area for public ownership. An adjustment is made to the points for the area's size.

Add 50 points for presence of each of the following: Points

- ☐ Multiple Recreational Opportunity _____
☐ Outstanding Scenic Value _____
☐ Outstanding Natural Features _____
☐ Outstanding Historical or Cultural Features _____
☐ Outstanding Educational Opportunity _____
☐ Existing Public Access _____

SUBTOTAL _____
Size Factor X _____
Other Value Total _____

VI. Potential for Habitat Improvement. Points will be awarded based on the potential of the area for habitat improvement under active management (dam construction or repair, forest operation, clearing, etc.) adjusted for the area's size. List activity(ies) and check one category: _____

- ☐ High (Add 50 points)
☐ Moderate (Add 30 points)
☐ Low (Add 10 points)
☐ None (No points)

SUBTOTAL _____
Size Factor X _____
Habitat Improvement Total _____

VII. Comments: Describe any special or outstanding features of the area (including use by endangered species, traditional public use, outstanding site quality, etc.) which makes this area unique or unusual. If additional space is needed, attach separate sheet.

SUMMARY

IA. Upland Habitat Total _____
IB. Aquatic Habitat Total _____
IC. Diversity Total _____
IIA. Special Components A Total _____
IIB. Special Components B Total _____

III. Surrounding Features Total _____
IV. Vulnerability Total _____
V. Other Values Total _____
VI. Habitat Improvement Total _____

Total Points: _____

Acres: _____

Average/Acre: _____

Habitat Availability Scores

Wildlife Management Unit (WMU)								
<u>Habitat Categories</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
<u>Upland Habitats</u>								
Cultivated Field	4.1	5.0	5.0	4.7	4.9	4.7	4.5	4.5
Fallow Field	4.8	5.0	4.9	4.9	5.0	5.0	4.8	4.8
Spruce Fir-Young	3.2	3.0	3.0	4.2	3.0	3.4	4.1	4.8
Spruce Fir-Old	4.5	3.8	4.5	4.7	4.5	4.8	4.8	5.0
Pine/hemlock-Young	5.0	4.9	4.9	4.3	4.5	4.8	4.3	4.0
Pine/hemlock-Old	4.9	4.9	4.9	4.5	4.6	4.9	4.3	3.8
N. Hardwoods-Young	3.7	4.3	3.5	3.2	3.8	2.8	3.4	3.5
N. Hardwoods-Old	4.5	3.0	4.2	4.5	4.6	4.4	4.5	4.5
<u>Aquatic Habitats</u>								
Deep Marsh	4.9	5.0	4.9	4.7	4.9	4.9	4.8	4.8
Shallow Marsh	4.9	4.9	4.9	4.7	4.9	4.7	4.7	4.8
Wooded swamp	4.4	4.8	4.8	4.4	4.9	4.8	4.4	4.8
Estuary/salt Marsh	—	—	—	—	—	4.6	4.8	3.7
Bog/Fen	4.9	4.8	4.9	4.8	4.8	4.9	4.9	4.9
Open fresh-water	0.9	0.4	0.3	1.3	0.4	1.0	1.2	1.7
Stream/river (area of total aquatic assuming 10' average width)	4.4	4.2	4.2	4.2	4.6	4.4	4.4	4.6

